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RCRA (Resource Conservation and Recovery Act) Permit Quality Protocol

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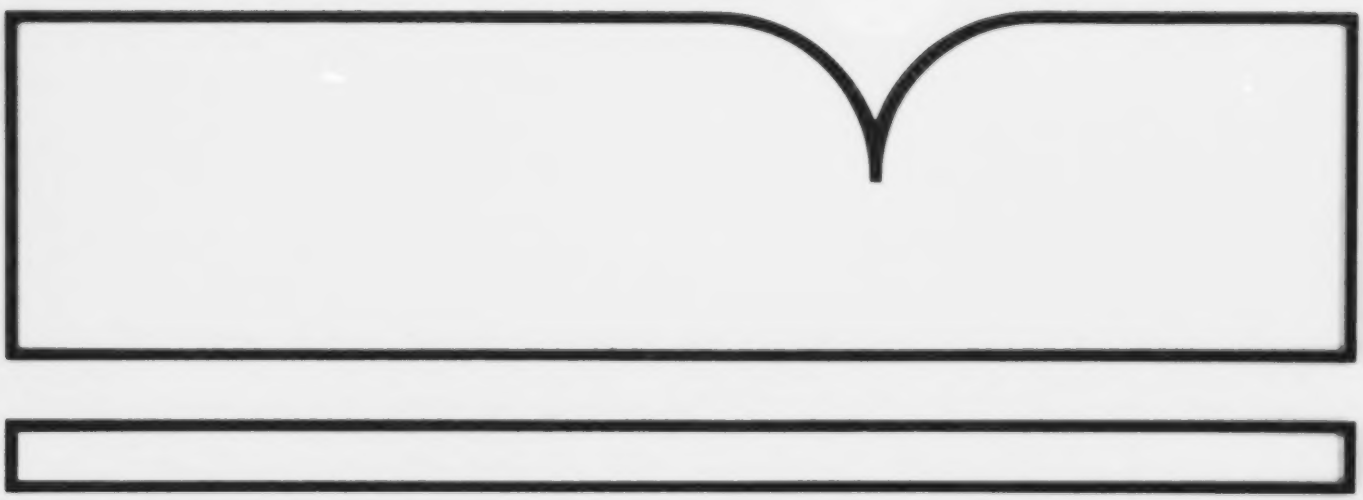
Prepared for

Environmental Protection Agency, Washington, DC

Aug 86



U.S. Department of Commerce
National Technical Information Service
NTIS

PB87-178307

EPA SOLID WASTE

RCRA PERMIT QUALITY

PROTOCOL

U.S. Environmental Protection Agency

August
1986

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See also Protocol for Evaluating Interim Status Closure/Post-Closure Plans. Both protocols to be updated annually.

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This document provides a format for evaluating the quality of RCRA permits issued by States or EPA Regions. It is intended for use by technical or non-technical personnel and is designed to assist in detecting omissions and inadequate permit conditions. Effective use of the protocol requires a working knowledge of the RCRA regulations and Agency policy and guidance, along with some familiarity with the format and content of RCRA permits.

The protocol does not consider the direct evaluation of technical adequacy, but rather identifies the technical items that must be addressed by the condition and those documents, analyses, etc., that support the condition and must be in the administrative record. This is intended to help the reviewer ascertain whether the condition was properly derived and whether the process followed was properly documented in the record.

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ERRATA SHEET

RCRA Permit Quality Protocol

Part 1

1. No changes.

Part 2

2. No changes.

Part 3

3. Provisions dealing with exemptions from regulatory requirements have not been included in Part 3.

Part 4

4. Page 4-96: Add "TEGD" under reference column.

5. Page 4-97: Add "TEGD" under reference column.

EPA SOLID WASTE

RCRA PERMIT QUALITY

PROTOCOL

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RCRA PERMIT QUALITY PROTOCOL

This publication was prepared
for the Office of Solid Waste
under Contract No. 68-01-7038

by

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U.S. Environmental Protection Agency

August
1986

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RCRA PERMIT QUALITY PROTOCOL

GENERAL INSTRUCTIONS FOR PERMIT REVIEWS

GENERAL INSTRUCTIONS FOR PERMIT REVIEWS

INTRODUCTION

This protocol has been developed to provide a format for evaluating the quality of RCRA permits issued by states or by EPA Regions. It is intended for use by technical or non-technical personnel, and is designed to assist in detecting omissions and inadequate permit conditions. Effective use of the protocol requires a working knowledge of the RCRA regulations and Agency policy and guidance, along with some familiarity with the format and content of RCRA permits. EPA and State staff also may find the protocol a useful aid in reviewing permit applications and drafting permits.

The protocol is divided into four major parts. These are:

- Part 1 - Background Information
- Part 2 - Procedural Requirements
- Part 3 - Permit Checklist
- Part 4 - Permit Condition Evaluation Guidance

Certain requirements of the Hazardous and Solid Waste Amendments of 1984 are addressed in Appendices. Appendix A provides a checklist of permit conditions required in Research, Development and Demonstration (R,D&D) permits. Because of the process-specific nature of R,D&D permit conditions, no permit condition evaluation guidance is provided. Appendix B contains a protocol for evaluating permit conditions related to corrective action for continuing releases for solid waste management units.

The structure of the protocol lends itself to a multi-level review of a permit. After determining that the administrative record for a facility is complete and the appropriate procedural requirements were followed, the reviewer can use Parts 3 and 4 of the protocol to determine if the permit contains the required conditions and if the conditions are technically sound and enforceable.

Field testing of the protocol has shown that use of the Checklist for Permit Conditions (Part 3) to determine if the permit contains all required conditions results in a rapid, preliminary indication of the quality of a permit. This suggests two approaches to auditing permits. A large number of permits can be examined rather rapidly using only Parts 1 through 3 of the protocol. The reviewer may wish to confirm the conclusions of that process by spot checking the quality of a few permit conditions using the evaluation criteria of Part 4 of the protocol. Alternatively, the reviewer may want to focus on fewer permits by applying the entire protocol to each permit examined. Although more time consuming, this approach results in a thorough audit of each permit examined.

Field testing of the protocol showed that audit of a storage permit using only Part 1 through 3 requires only a couple of hours, while auditing a land disposal permit in the same fashion requires four to five hours. Full audit (using Parts 1-4) of a storage permit requires approximately four hours. Full audit of a land disposal permit requires eight hours or more.

The most effective use of the protocol may be to combine these two approaches. That is, Parts 1 through 3 of the protocol are applied to all permits to be audited, with certain of those permits selected for more intense scrutiny utilizing the Part 4 evaluation guidance.

Below is a brief description of each part of the protocol, with comments on their use.

PART 1 - BACKGROUND INFORMATION

This portion of the protocol focuses on data and information about the facility and the wastes handled. Most of the information needed to complete the form can be obtained from three sources: 1) the applicant's Part A application; 2) the General Facility Description contained in the Part B application; and 3) the Fact Sheet or Statement of Basis associated with the permit.

Completion of the background information form provides the reviewer with the information needed to determine what portions of the Permit Checklist (Part 3) and the Permit Condition Evaluation Guidance (Part 4) are applicable to the permit undergoing review. It also enables the reviewer to recognize which conditions (such as those related to the handling of reactive, ignitable or incompatible wastes) must be in the permit.

PART 2 - PROCEDURAL REQUIREMENTS

The procedural requirements checklist guides the reviewer in evaluating the following:

1) whether the administrative record is complete;

2) whether the proper steps have been taken in soliciting public comment and in issuing the draft permit;

3) whether adjustments to the permit have been made to reflect substantive public comments; and

4) whether any modifications to the permit have been properly made.

A key consideration is the permit file or administrative record. The materials found in the administrative record should document and support permit conditions. The evaluation of permit conditions conducted under Part 4 of this protocol relies heavily upon scrutiny of the various documents found in the administrative record. Inventory of the administrative record enables the reviewer not only to assess its

completeness, but also to become familiar with its contents in preparation for evaluating the permits.

PART 3 - RCRA PERMIT CHECKLIST

The RCRA permit checklist is a structured listing of all regulatory permit conditions. The checklist is organized in twelve sections loosely paralleling the organization of a permit. They are:

I	Standard Conditions
II	General Facility Conditions
III	Storage in Containers
IV	Storage or Treatment in Tanks
V	Surface Impoundments
VI	Waste Piles
VII	Land Treatment
VIII	Landfills
IX	Incineration
X	Groundwater Monitoring - Detection Monitoring Program
XI	Groundwater Monitoring - Compliance Monitoring Program
XII	Groundwater Monitoring - Corrective Action Monitoring Program

Sections I (Standard Conditions) and II (General Facility Conditions) are found in all permits. The remaining sections address the various units that a given facility may contain and their regulatory status. This approach allows the reviewer to check for all permit conditions or to spot check by checking those conditions associated with certain sections of the permit.

The checklist is intended to be an administrative checklist for recording the presence or absence of each required permit condition. The actual quality (or adequacy) of a condition is considered in greater detail in Part 4 of the protocol. Checklist items included in the protocol are denoted with a "+" symbol in the left-hand margin.

If a required condition is not found in the permit, the reviewer must check the permit file or the administrative record prior to recording that condition as missing. An explanation must be provided for any requirement intentionally waived or deleted from the permit. If a fact sheet has been prepared for the facility, the explanation must be provided in the fact sheet.

In completing the checklist the reviewer simply marks each item as provided (denoted by Y), not provided (denoted by N), or as not applicable (denoted by NA) and indicates the location of the item. The comments column may be used by the reviewer for any notations desired. For example, the reviewer may provide a reminder to check a certain permit condition using the Permit Condition Evaluation Guidance (Part 4). Or, the reviewer may provide a notation to discuss the rationale for a condition with the permit writer.

PART 4 - PERMIT CONDITION EVALUATION GUIDANCE

Part 4 of the protocol provides a format and guidance for evaluating the adequacy of selected permit conditions. The conditions included in this portion of the protocol are those generally believed to be more critical to the proper regulation of hazardous waste management units and/or those having a high potential for problems in translating regulatory requirements to permit conditions. These items are denoted on the permit checklist with a "+" in the left-hand margin.

Part 4 is designed to evaluate permit conditions for three criteria:

1) consistency with regulations and applicable guidance;

2) technical soundness; and

3) enforceability.

The evaluation guidance for each permit condition consists of a matrix with four columns - regulatory requirement, evaluation criteria, references, and findings/comments.

The regulatory requirement consists of a brief statement defining what the permit condition must address or encompass. This enables the reviewer to evaluate if the developed permit condition is consistent with regulations and appropriate guidance. This protocol addresses two types of permit conditions - those directly mandated by regulation (such as those required by 40 CFR Part 270) and those which specify the steps to be taken by the permittee in meeting performance standards specified by statute or regulation. The latter type occurs most frequently when considering design, construction, and operation of TSD units.

The evaluation criteria consider technical soundness and enforceability. Technical soundness encompasses both technical correctness and proper documentation and supporting evidence for the technical content of a permit condition. This protocol does not consider the direct evaluation of technical adequacy, but rather identifies the technical items that must be addressed by the condition and those documents, analyses, etc., that support the condition and must be in the administrative record. This should enable the reviewer to ascertain whether the permit condition was properly derived and whether the process followed is properly documented in the record.

Every permit condition should be enforceable in some manner. Enforcement mechanisms include document submittal and monitoring and recordkeeping by the owner/operator, and inspection of facilities and records by the agency. Enforcement mechanisms, other than agency inspection, must be stated as permit conditions.

The enforceability of a permit condition is often a function of the specific wording in the permit. For example, a permit condition stating that "... a run-on/runoff control system must be inspected weekly", leaves no doubt, or point for argument, as to the required frequency of

inspection. However, a similar permit condition stating that "... run-on/runoff control systems will be inspected as deemed necessary" would be more difficult to enforce because the definition of "as deemed necessary" could be argued by the permittee. Therefore, in order for a permit condition to be enforceable, it must be stated in a clear, concise, and definitive manner that will minimize the possibility of misinterpretation.

The column headed "References" lists those guidance documents and other sources where the reviewer can obtain additional guidance or clarification. In the interest of brevity, the document titles are abbreviated. The following four pages contain a listing of references cited in this protocol and their corresponding abbreviations.

REFERENCES

ABBREVIATION	REFERENCE
General Facility Conditions	
PAGM-GFS	U.S. EPA. 1983. Permit Applicant's Guidance Manual for the General Facility Standards of Part 264.
PAGM-CLAEAR	U.S. EPA. 1984. Permit Writers' Guidance Manual for Hazardous Waste Land Storage and Disposal Facilities - Criteria for Location Acceptability and Existing Applicable Regulations.
PWGD-HW Tanks	U.S. EPA. Undated. Draft Permit Writers' Guidance Manual for Hazardous Waste Tanks. U.S. EPA Region II. New York.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
Containers	
PWGD-Containers	U.S. EPA. 1982. Draft Guidance for Permit Writers - Facilities Storing Hazardous Waste in Containers. U.S. EPA, Office of Solid Waste. Washington, D.C.
Tanks	
PWGD-HW Tanks	U.S. EPA. Undated. Draft Permit Writers' Guidance Manual for Hazardous Waste Tanks. U.S. EPA Region II. New York.
Tank Guidance Memo	Skinner, John H. Undated. Draft Memorandum to Regional RCRA Branch Chiefs - Guidance on Permitting of Hazardous Waste Treatment/Storage Tanks.
Waste Piles	
WPDLS	U.S. EPA. 1982. Draft RCRA Guidance Document: Waste Pile Design.
Liner Systems	
PWGM	U.S. EPA. 1983. Permit Writers' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.

ABBREVIATION	REFERENCE
SW-846	U.S. EPA. 1982. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
NSF9	National Sanitation Foundation. 1983. Standard 54: Flexible Membrane Liners.
SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
GDLS	U.S. EPA. 1984. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation.
Surface Impoundments	
PWGM	U.S. EPA. 1983. Permit Writers' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
HSWA	Hazardous and Solid Waste Amendments of 1984.
Liner Memo	McGraw, Jack. 1985. Draft Guidance Memorandum - Implementation of Minimum Technology Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems.
GDLS	U.S. EPA. 1984. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation.
SW-846	U.S. EPA. 1982. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
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SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
Landfills	
HSWA	Hazardous and Solid Waste Amendments of 1984.
Liner Memo	McGraw, Jack. 1985. Draft Guidance Memorandum - Implementation of Minimum Technology Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems.
PWGM	U.S. EPA. 1983. Permit Writers' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
GDLS	U.S. EPA. 1984. Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments--Design, Construction, and Operation.
CQA	U.S. EPA. 1985. Construction Quality Assurance for Hazardous Waste Land Disposal Facilities. Draft. EPA/530-SW-850021.
BLM	U.S. EPA. 1985. Prohibition on the Disposal of Bulk Liquid Hazardous Wastes in Landfills. Statutory Interpretive Guidance. Draft (May 6).
SW-846	U.S. EPA. 1982. Test Methods for Evaluating Solid Waste - Physical and Chemical Methods. SW-846.
NSF	National Sanitation Foundation. 1983. Standard 54: Flexible Membrane Liners.
SW-870	U.S. EPA. 1983. Lining of Waste Impoundment and Disposal Facilities. SW-870.
SW-869	U.S. EPA. 1983. Landfill and Surface Impoundment Performance Evaluation. SW-869.

ABBREVIATION	REFERENCE
SW-84-001	U.S. EPA. 1984. Procedures for Modeling Flow Through Clay Liners to Determine Required Thickness. EPA/530-SW-84-001.
SW-925	U.S. EPA. 1984. Soil Properties, Classification, and Hydraulic Conductivity Testing. SW-925.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
LDFC	U.S. EPA. 1982. Draft RCRA Guidance Document - Landfill Design. Liner Systems and Final Cover.
SW-867	U.S. EPA. 1982. Evaluating Cover Systems for Solid and Hazardous Wastes. SW-867.
Land Treatment	
PGM-HWLTD	U.S. EPA. 1984. Permit Guidance Manual on Hazardous Waste Land Treatment Demonstrations. EPA/530-SW-84-015.
PGM/UZM-HWLT	U.S. EPA. 1984. Permit Guidance Manual on Unsaturated Zone Monitoring for Hazardous Waste Land Treatment Units. EPA/530-SW-84-016.
HWLT	U.S. EPA. 1983. Hazardous Waste Land Treatment. SW-874.
PAGM	U.S. EPA. 1984. Permit Applicants' Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal. EPA/530 SW-84-004.
Incineration	
GM-HWIP	U.S. EPA. 1983. Guidance Manual for Hazardous Waste Incinerator Permits.
MP	U.S. EPA. 1983. Model Permit for Hazardous Waste Treatment, Storage and Disposal Facilities.
EH-HWI	U.S. EPA. 1980. Engineering Handbook for Hazardous Waste Incineration.
Groundwater Monitoring	
PWGM-GWP	U.S. EPA. 1983. Permit Writers' Guidance Manual for 264 Subpart F Groundwater Protection.
MGWSP	U.S. EPA. 1981. Manual of Groundwater Quality Sampling Procedures.

ABBREVIATION	REFERENCE
ACLG	U.S. EPA. 1985. Alternate Concentration Limit Guidance Based on §264.94(b) Criteria. Part I. Information Required in ACL Demonstrations.
TEGD	U.S. EPA. 1986. RCRA Groundwater Monitoring Technical Enforcement Guidance Document.

RCRA PERMIT QUALITY PROTOCOL

PART 1. BACKGROUND INFORMATION

RCRA PERMIT QUALITY PROTOCOL
BACKGROUND INFORMATION

Facility Name: _____

Location: _____

EPA I.D. Number: _____

Owner/Operator: _____

Treatment/Storage/Disposal Units Addressed by Permit:

	Existing Unit	New Unit
___ Container Storage	____	____
___ Storage in Tanks	____	____
___ Treatment in Tanks	____	____
___ Waste Piles	____	____
___ Storage Surface Impoundments	____	____
___ Disposal Surface Impoundments	____	____
___ Landfills	____	____
___ Land Treatment Demonstration	____	____
___ Land Treatment Units	____	____
___ Incinerator (Short-term Operations)	____	____
___ Incinerator (Full Operations)	____	____
___ Other	____	____

Does the permit cover all treatment, storage and disposal units at the facility?

___ Yes ___ No

List the major wastes or types of wastes handled at the facility.

_____

_____

_____

_____

_____

Are wastes from off-site generators handled at the facility?

___ Yes ___ No

Are reactive or ignitable wastes handled at the facility?

___ Yes ___ No

Are incompatible wastes handled at the facility?

___ Yes ___ No

List the TSD units where reactive, ignitable or incompatible wastes are handled.

_____

_____

_____

_____

_____

If groundwater monitoring is required at the facility, do the data obtained during the interim status monitoring program show any evidence of groundwater contamination?

___ Yes ___ No ___ N.A.

Have there been identified at the facility any solid waste management units (SWMU) other than the hazardous waste management units covered in the permit?

___ Yes ___ No

Have any releases (or probable releases) been identified that require corrective action or that require additional studies to characterize?

___ Yes ___ No

Have any enforcement actions been taken against the owner/operator of the facility?

___ Yes ___ No ___ Enforcement files not reviewed

If yes, briefly describe.

_____

_____

_____

RCRA PERMIT QUALITY PROTOCOL
BACKGROUND INFORMATION
- Continued -

Type of permit: ___ Draft ___ Final

Issuing Agency: EPA Region _____ State _____ Joint _____

Reviewer: _____

Date: _____

RCRA PERMIT QUALITY PROTOCOL

PART 2. PROCEDURAL REQUIREMENTS

RCRA PERMIT QUALITY PROTOCOL
PROCEDURAL REQUIREMENTS

ADMINISTRATIVE RECORDS

The contents of the administrative record (file) associated with the permit must be inventoried. Indicate below the items contained in the file.

___ Permit application (Parts A and B) and any support data, technical reports, etc., provided by the applicant.

___ Documentation resulting from the agency's completeness review of the permit application.

___ Any notices of deficiency sent to the applicant, along with the applicant's amended or supplemental information.

___ Pre-permit site inspection report.

___ Documentation resulting from the agency's technical evaluation of the permit application.

___ Exposure Information Report (EIR) along with documentation of agency's review findings.

___ Applicant's report addressing solid waste management units (SWMU) and releases and the agency's RCRA Facility Assessment (RFA) or Preliminary Assessment/Site Investigation (PA/SI) Report.

___ Applicant's certification (see §270.73) of compliance with groundwater monitoring and financial responsibility requirements (for land disposal facilities only).

___ Applicant's certification of waste minimization.

___ The draft permit.

___ Statement of basis or fact sheet.

___ All documents cited in statement of basis or fact sheet.

If the permit is a final permit, note the presence of the following additional items in the file.

___ Public Notice(s).

___ All comments received during the public comment period.

___ Tape or transcript of any hearings held and any written materials submitted at hearings.

___ Responses to significant comments posed during the comment period and/or hearing.

___ Final permit.

___ Explanation of changes from draft to final permit.

___ Where applicable, materials relating to:

- o Consistency determinations under Coastal Zone Management Act
- o Consultation under the Endangered Species Act
- o Determination under Section 403(c) of the Clean Water Act
- o Consistency with the Wild and Scenic Rivers Act
- o Cooperation with the National Historic Preservation Act
- o Consistency with the Fish and Wildlife Coordination Act
- o Other (state, local) laws and regulations

___ Where applicable, appropriate documentation for modification of the permit (including public participation activities, where necessary).

PUBLIC NOTICE AND COMMENT

Was a public notice issued announcing availability of the draft permit and providing an opportunity for comment at least 45 days prior to final permit decision?

___ Yes ___ No

If a public hearing was held, was a notice of public hearing issued at least 30 days prior to the hearing?

___ Yes ___ No

Was a summary response to significant comments raised during the comment period and/or hearing prepared and issued at the time of final permit decision?

___ Yes ___ No

RECORDS OF MODIFICATION (to be completed if the permit was modified, or revoked and reissued)

Was the permit modified pursuant to 40 CFR 270.41?
If yes, specify the basis identified in the permit documentation (alterations; new information; new regulations; compliance schedules; variance request; reopener)

___ Yes ___ No

Did cause exist for modification or revocation and reissuance pursuant to 40 CFR 270.41(a)?

___ Yes ___ No

If yes, specify the cause:

a. Cause exists for termination, as provided in 40 CFR 270.43 (noncompliance; misrepresentation of or failure to disclose facts; endangerment to human health or environment; change in condition);

b. Transfer of permit;

c. Other (specify) _____

_____

Does the permit documentation indicate that the procedures of 40 CFR 124.5 for permit modification, revocation and reissuance or termination were followed?

___ Yes ___ No

Were minor modifications made to the permit?

___ Yes ___ No

If yes, indicate the specific reasons as per 270.42.

_____

_____

Does the administrative record contain documentation of consent by permittee to those minor modifications?

___ Yes ___ No

REVIEW BY COUNSEL

Does the administrative record contain documentation of review and approval of the permit by agency counsel?

___ Yes ___ No

Reviewer: _____

Date: _____

RCRA PERMIT QUALITY PROTOCOL

PART 3. PERMIT CHECKLIST

Facility Name _____
ID No. _____

RCRA PERMIT CHECKLIST

		Provided (Y/N) or NA	Location	Comments
I	STANDARD CONDITIONS			
A	Effect of Permit [§§270.4, 270.30(g)]	____	_____	_____
B	Permit Actions [§270.30(f)]	____	_____	_____
C	Severability [§124.16(a)]	____	_____	_____
D	Duties and Requirements			
D-1	Duty to comply [§270.30(a)]	____	_____	_____
D-2	Duty to reapply [§§270.30(b), 270.10(h)]	____	_____	_____
D-3	Permit expiration [§270.51]	____	_____	_____
D-4	Need to halt or reduce activity not a defense [§270.30(c)]	____	_____	_____
D-5	Duty to mitigate [§270.30(d)]	____	_____	_____
D-6	Proper operation and maintenance [§270.30(e)]	____	_____	_____
D-7	Duty to provide information [§§270.30(h), 264.74(a)]	____	_____	_____
D-8	Inspection and entry [§270.30(i)]	____	_____	_____
D-9	Monitoring and records [§§270.30(j), 270.30(l)(4)]	____	_____	_____
D-10	Reporting planned changes [§270.30(l)(1)]	____	_____	_____
D-11	Certification of construction or modification [§270.30(l)(2)(i)]	____	_____	_____
D-12	Anticipated noncompliance [§270.30(l)(2)]	____	_____	_____
D-13	Transfer of permits [§§270.30(l)(3), 270.40]	____	_____	_____
+D-14	Compliance schedules [§270.30(l)(5)]	____	_____	_____
D-15	Twenty-four hour reporting [§§270.30(l)(6), 264.56(d) and (j)]	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
D-16	Manifest discrepancy reports and unmanifested waste reports [§270.30(l)(7) and (8)]	____	_____	_____
D-17	Biennial report [§270.30(l)(9)]	____	_____	_____
D-18	Other noncompliance [§270.30(l)(10)]	____	_____	_____
D-19	Other information [§270.30(l)(11)]	____	_____	_____
E	Signatory Requirements [§§270.11, 270.30(k)]	____	_____	_____
F	Confidential Information [§270.12]	____	_____	_____
+G	Documents to be Submitted Prior to Operation [§§270.32, 270.33]	____	_____	_____
H	Documents to be Maintained at Facility Site			
H-1	Waste analysis plan [§264.13(b)]	____	_____	_____
H-2	Personnel training documents/records [§264.16(d)]	____	_____	_____
H-3	Contingency plan [264.53(a)]	____	_____	_____
H-4	Closure plan/post-closure plan [§264.112(a)]	____	_____	_____
H-5	Closure cost estimate/post-closure cost estimate [§264.142(d)]	____	_____	_____
H-6	Operating record [§264.73]	____	_____	_____
H-7	Inspection schedule(s) [§264.15(b)]	____	_____	_____
H-8	Other documents	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
II	GENERAL FACILITY CONDITIONS			
A	Design and Operation of Facility [§264.31]	____	_____	_____
B	Required Notices [§264.12]	____	_____	_____
C	General Waste Analysis [§264.13]			
C-1	Parameters to be analyzed for in each waste [§264.13(b)(1)]	____	_____	_____
C-2	Analytical methods [§264.13(b)(2)]	____	_____	_____
C-3	Methods to sample wastes [§264.13(b)(3)]	____	_____	_____
C-4	Frequency of analysis [§264.13(b)(4)]	____	_____	_____
C-5	Wastes from off-site [§264.13(a)(4) and (b)(5)]	____	_____	_____
C-6	Waste characterization requirements for specific types of treatment and disposal [§264.13(b)(6)]	____	_____	_____
D	Security [§264.14]			
D-1	Description of barrier and means to control entry (or 24-hour surveillance system) [§264.14(b)]	____	_____	_____
D-2	Description of warning signs [§264.14(c)]	____	_____	_____
E	General Inspection Requirements* [§264.15]			
+E-1	General inspection schedule [§264.15(b)]	____	_____	_____
E-1a	items to be inspected [§264.15(b)(1)]	____	_____	_____
E-1b	type of problems for which each item is inspected [§264.15(b)(3)]	____	_____	_____
E-1c	inspection frequency [§264.15(b)(4)]	____	_____	_____
E-2	Container storage areas [§264.174]	____	_____	_____
E-3	Tank storage/treatment areas [§264.194]	____	_____	_____
E-3a	overfilling controls [§264.194(a)(1)]	____	_____	_____

*Items E-2 through E-8 to be reviewed when applicable.

		Provided (Y/N) or NA	Location	Comments
E-3b	monitoring equipment data [§264.194(a)(2)]			
E-3c	level of waste (uncovered tanks) [§264.194(a)(3)]			
E-3d	tank construction materials [§264.294(a)(4)]			
E-3e	area surrounding tank [§264.194(a)(5)]			
+E-3f	schedule and procedure for assessing tank condition and shell thickness [§264.194(b)]			
E-4	Waste piles [§264.254]			
E-4a	run-on/runoff control [§264.254(b)(1)]			
E-4b	leak detection systems [§264.254(b)(2)]			
E-4c	wind dispersal control [§264.254(b)(3)]			
E-4d	leachate collection/removal system [§264.254(b)(4)]			
+E-5	Surface impoundments [§264.226]			
E-5a	overtopping control system [§264.226(b)(1)]			
E-5b	level of impoundment contents [§264.226(b)(2)]			
E-5c	liquids in leak detection systems [§264.226(b)(3)]			
E-5d	dike deterioration [§264.226(b)(4)]			
E-5e	certification of dike's structural integrity [§264.226(c)]			
E-6	Incinerators [§264.347]			
E-6a	incinerator/associated equipment [§264.347(b)]			
E-6b	waste feed cut-off system testing [§264.347(c)]			
E-7	Landfills [§264.303]			
E-7a	run-on/runoff control [§264.303(b)(1)]			
E-7b	liquids in leak detection system [§264.303(b)(2)]			
E-7c	wind dispersal control [§264.303(b)(3)]			

		Provided (Y/N) or NA	Location	Comments
E-7d	leachate collection/removal system [§264.303(b)(4)]	____	_____	_____
E-8	Land treatment units [§264.273]	____	_____	_____
E-8a	run-on/runoff control [§264.273(g)(1)]	____	_____	_____
E-8b	wind dispersal control [§264.273(g)(2)]	____	_____	_____
F	Personnel Training [§264.16]			
F-1	Program director [§264.16(a)(2)]	____	_____	_____
F-2	Training program contents [§264.16(a)(3)]	____	_____	_____
F-3	Frequency of training [§264.16(b) and (c)]	____	_____	_____
G	General Requirements for Ignitable, Reactive, or Incompatible Waste [§264.17]			
G-1	Ignitable or reactive [§264.17(a)]	____	_____	_____
G-2	Incompatibles [§264.17(b)]	____	_____	_____
H	Location Standards [§§264.18, 270.14(b)(11)]			
H-1	Seismic considerations [§264.18(a)]	____	_____	_____
+H-2	Flood proofing description/drawings [§264.18(b)]	____	_____	_____
+H-3	Flood plan [§264.18(b)]	____	_____	_____
I	Preparedness and Prevention			
I-1	Required equipment [§264.32]	____	_____	_____
I-2	Testing and maintenance of equipment [§264.33]	____	_____	_____
I-3	Access to communications or alarm system [§264.34]	____	_____	_____
I-4	Required aisle space [§264.35]	____	_____	_____
I-5	Arrangements with local authorities [§264.37]	____	_____	_____
J	Contingency Plan			
J-1	Implementation of plan [§264.51]	____	_____	_____
J-2	Copies of plan [§264.53]	____	_____	_____
J-3	Amendments to plan [§264.54]	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
J-4	Contents of contingency plan [§264.52]			
J-4a	response procedures [§264.52(a)]			
J-4b	coordination agreements [§264.52(c)]			
J-4c	emergency coordinators [§§264.52(d), 264.55]			
J-4d	emergency equipment [§264.52(e)]			
J-4e	evacuation plan [§264.52(f)]			
J-5	Emergency procedures [§264.56]			
J-5a	notification [§264.56(a)]			
J-5b	identification of hazardous materials [§264.56(b)]			
J-5c	assessment of hazards [§264.56(c)]			
J-5d	notification in event of threat to human health or the environment [§264.56(d)]			
J-5e	prevention of recurrence or spread of fires, explosions, or releases [§264.56(e)]			
J-5f	monitoring following cessation of operations [§264.56(f)]			
J-5g	storage and treatment of released materials [§264.56(g)]			
J-5h	incompatible wastes [§264.56(h)(1)]			
J-5i	post-emergency equipment maintenance [§264.56(h)(2)]			
J-5j	notification and reports [§264.56(i) and (j)]			
+J-6	Unit-specific control procedures (where applicable			
J-6a	tanks [§264.194(c)]			
J-6b	waste piles [§§264.252(b), 264.253(b)]			
J-6c	surface impoundments [§264.227]			
K	Manifest System [§§264.71, 264.72]			
L	Recordkeeping and Reporting			
L-1	Operating record [§264.73]			

		Provided (Y/N) or NA	Location	Comments
L-2	Availability of records [§264.74]			
L-3	Biennial report [§264.75]			
L-4	Unmanifested waste report [§264.76]			
M	General Closure Requirements*			
M-1	Requirement for written plan [§264.112(a)]			
M-2	Content of closure plan [§264.112(b)]			
M-2a	description of final closure [§264.112(b)(2)]			
M-2b	maximum waste inventory [§264.112(b)(3)]			
M-2c	decontamination or removal procedures [§§264.112(b)(4), 264.114]			
M-2d	other activities required to meet closure standard [§264.112(b)(5)]			
M-2e	closure schedule [§§264.112(b)(6), 264.113]			
M-2f	estimated year of final closure (where applicable) [§264.112(b)(7)			
M-3	Amendment of plan [§264.112(c)]			
M-4	Notification of partial closure and final closure [§264.112(d)]			
M-5	Removal of wastes and decontamination or dismantling of equipment [§264.112(e)]			
M-6	Certification of closure [§264.115]			
M-7	Survey plat (where applicable) [§264.116]			
N	General Post-Closure Requirements			
N-1	Post-closure care period [§264.117(a)(1)]			
N-2	Security requirements (where applicable) [§264.117(b)]			
N-3	Post-closure use of property [§264.117(c)]			
N-4	Requirement for a written plan [§264.118(a) and (c)]			

*The general closure requirements applicable to all types of hazardous waste management units are listed under item M. The specific technical requirements applicable to each type of unit are listed under those units.

		Provided (Y/N) or NA	Location	Comments
N-5	Contents of post-closure plan [§264.118(b)]	____	_____	_____
N-5a	groundwater monitoring program (see Section XII of checklist) [§264.118(b)(1)]	____	_____	_____
N-5b	maintenance activities [§264.118(b)(2)]	____	_____	_____
N-5c	post-closure contact [§264.118(b)(3)]	____	_____	_____
N-6	Amendment of post-closure plan [§264.118(d)]	____	_____	_____
N-7	Post-closure notices [§264.119]	____	_____	_____
N-7a	notice to local land authority [§264.119(a)]	____	_____	_____
N-7b	notice in deed (disposal facilities only) [§264.119(b)]	____	_____	_____
N-7c	revision of deed notice [§264.119(c)]	____	_____	_____
O	Cost Estimate for Facility Closure and Post-Closure [§§264.142, 264.144]	____	_____	_____
P	Financial Assurance for Facility Closure [§§264.143, 264.145]	____	_____	_____
Q	Liability Requirements [§264.147]	____	_____	_____
R	Incapacity of Owners or Operators, Guarantors, or Financial Institutions [§264.148]	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
III	STORAGE IN CONTAINERS			
A	Condition of Containers [§264.171]	____	_____	_____
B	Compatibility of Containers with Wastes [§264.172]	____	_____	_____
C	Management Requirements [§264.173]	____	_____	_____
+D	Construction and Maintenance of Containment System [§264.175]			
D-1	Base or liner material* [§264.175(b)(1)]	____	_____	_____
D-2	Design features for drainage of leaks and spills [§264.175(b)(2)]	____	_____	_____
D-3	Containment system capacity* [§264.175(b)(3)]	____	_____	_____
D-4	Prevention of run-on [§264.175(b)(4)	____	_____	_____
D-5	Procedures for removal of spills and accumulated precipitation [§264.175(b)(5)]	____	_____	_____
E	Special Requirements for Ignitable or Reactive Wastes [§264.176]	____	_____	_____
F	Special Requirements for Incompatible Wastes [§264.177]	____	_____	_____

*These requirements do not apply to container storage areas where solids only (i.e., no free liquids) are stored.

		Provided (Y/N) or NA	Location	Comments
IV	STORAGE OR TREATMENT IN TANKS*			
B	Tank Design and Construction [§264.191]			
+B-1	Minimum shell thickness	____	_____	_____
B-2	Dimensions and volume of tank	____	_____	_____
B-3	Materials of construction	____	_____	_____
B-4	Tank foundation	____	_____	_____
B-5	Structural supports	____	_____	_____
B-6	Seams	____	_____	_____
B-7	Pressure controls (for closed tanks)	____	_____	_____
C	General Operating Requirements [§264.192]			
C-1	Measures for protection from accelerated erosion, corrosion or abrasion [§264.192(a)]	____	_____	_____
C-2	Features or procedures to protect from overfilling [§264.192(b)]	____	_____	_____
C-3	Special requirements for ignitable or reactive wastes (NFPA buffer zone compliance) [§264.198]	____	_____	_____
D	Special Requirements for Incompatible Wastes [§264.199]	____	_____	_____
E	Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027 [§264.200]	____	_____	_____

*This portion of the checklist is based upon the tank regulations in effect until December.

		Provided (Y/N) or NA	Location	Comments
V	SURFACE IMPOUNDMENTS			
A	Impoundment Design and Construction [§§264.221, 264.226]			
A-1	Impoundment dimensions and capacity			
A-2	Dike design and construction			
+A-2a	design specifications			
A-2b	material specifications			
A-2c	construction specifications			
A-2d	construction inspection program			
+A-3	Hydraulic features			
A-3a	inlet and outlet structures			
A-3b	measures to prevent overtopping			
A-3c	freeboard maintenance			
B	Operating Procedures [§264.221(f)]			
B-1	Procedures to prevent overtopping			
B-2	Specification of outflow destination			
B-3	Emergency location for wastes			
C	Liner System* [§264.221(a) and (c)]			
+C-1	Liner system description			
C-2	Synthetic liner			
+C-2a	synthetic liner material, thickness and manufacturer			
+C-2b	synthetic liner bedding			
+C-2c	synthetic liner installation procedures, including seaming			
+C-2d	inspection and quality assurance program			

*Note: Some sites may be exempt from the liner system requirements or may have modified liner requirements.

		Provided (Y/N) or NA	Location	Comments
+C-2e	exposure prevention			
C-3	Soil liner			
+C-3a	soil liner thickness and material specifications			
+C-3b	soil liner construction specifications			
+C-3c	construction inspection and monitoring program			
C-4	Leachate detection system			
+C-4a	design specifications			
+C-4b	material specifications			
+C-4c	installation specifications			
C-4d	inspection program during installation			
+C-5	Liner foundation preparation			
D	Maintenance [§§264.221, 264.227]			
D-1	Leachate detection system maintenance procedures			
D-2	Liner repairs			
D-3	Maintenance of dikes			
E	Special Requirements for Ignitable or Reactive Wastes [§264.229]			
F	Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027 [§264.231]			
G	Closure Plan for Impoundments to be Closed* With Wastes in Place [§264.228] - see checklist item I and J under VIII - LANDFILLS			

*Impoundments to be clean closed require contingent closure and post-closure plans.

		Provided (Y/N) or NA	Location	Comments
VI	WASTE PILES			
A	Design and Operating Requirements [§264.251]			
A-1	Liner system* [§264.251(a)]			
+A-1a	description of liner systems			
+A-1b	synthetic liner			
	o synthetic liner material, thickness and manufacturer			
	o synthetic liner bedding			
	o synthetic liner installation procedures, including seaming			
	o inspection and quality assurance program during installation			
	o exposure prevention			
+A-1c	soil liner			
	o soil liner thickness and material specifications			
	o soil liner construction procedures			
	o construction inspection and monitoring program			
+A-1d	leachate collection/detection system			
	o design description			
	o material specifications			
	o leachate head restriction			
	o installation procedures			
	o inspection and monitoring procedures during installation			
+A-1e	liner system foundation preparation			
A-1f	maintenance procedures			

*Note: Some sites may be exempt from the liner system requirements or may have modified liner requirements.

		Provided (Y/N) or NA	Location	Comments
	o maintenance of leachate collection detection system	____	_____	_____
	o liner repairs	____	_____	_____
A-2	Run-on control system [§§270.18(b), 264.250(c)]			
A-2a	design and performance	____	_____	_____
A-2b	construction	____	_____	_____
A-2c	maintenance	____	_____	_____
A-3	Management of collection and holding units	____	_____	_____
A-4	Control of wind dispersal [§§270.18(b), 264.250(c)]	____	_____	_____
B	Special Requirements for Ignitable or Reactive Wastes (where applicable) [§264.256]	____	_____	_____
C	Special Requirements for Incompatible Wastes (where applicable) [§264.257]	____	_____	_____
D	Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027 [§264.259]	____	_____	_____
E	Contingent Closure and Post-Closure Plans [§264.258(c)] - see checklist items I and J under VIII - LANDFILLS	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
VII	LAND TREATMENT*			
+A	Wastes to be Treated and Hazardous Constituents Requiring Degradation [§264.271(a)(1) and (b)]			
+B	Treatment Zone Description [§264.271(c)]			
C	Treatment Demonstrations [§264.272]			
C-1	Field plot demonstration - see requirements under D through L below			
+C-2	Laboratory demonstrations [§264.272(b) and (c)]			
C-2a	test duration [§264.272(b)]			
C-2b	test procedures [§264.272(b) and (c)(1)]			
C-2c	analytical procedures [§264.272(b)]			
C-2d	personnel protection [§264.272(c)(3)]			
D	Design and Operating Procedures [§264.273]			
+D-1	Waste application method [§264.273(a)(1)]			
+D-2	Waste application rate [§264.273(a)(1)]			
+D-3	Measures to control soil pH [§264.273(a)(2)]			
+D-4	Measures to enhance microbial and chemical reactions [§264.273(a)(3)]			
+D-5	Measures to control moisture content in the treatment zone [§264.273(a)(4)]			
+D-6	Run-on/runoff control [§264.273(b)/(c)/(d)/(e)]			
D-7	Wind disposal control [§264.273(f)]			
+D-8	Inspection procedures [§264.273(g)]			
+E	Unsaturated Zone Monitoring Plan [§264.278]			
E-1	Soil pore liquid [§264.278(a)-(f)]			
	o location			
	o frequency			

*Permits may be issued for land treatment demonstrations, land treatment operations, or both.

		Provided (Y/N) or NA	Location	Comments
	o parameters			
	o equipment			
	o installation			
	o sampling procedures			
	o analytical procedures			
	o chain-of-custody			
	o background values			
	o statistical analyses			
E-2	Soil cores [§264.278(a)-(f)]			
	o location			
	o frequency			
	o parameters			
	o equipment			
	o sampling procedures			
	o analytical procedures			
	o chain-of-custody			
	o background values			
	o statistical analyses			
F	Notification for Statistically Significant Differences [§264.278(g) and (h)]			
G	Food Chain Crops - Specification of Species [§264.276]			
H	Recordkeeping [§264.279]			
I	Closure and Post-Closure [§264.280]			
I-1	Continuation of treatment [§264.280(a)(1) and (c)(1)]			
I-2	Runoff control [§264.280(a)(2)]			
I-3	Run-on control [§264.280(a)(3) and (c)(3)]			

		Provided (Y/N) or NA	Location	Comments
I-4	Runoff management system [§264.280(a)(4) and (c)(4)]			
I-5	Wind dispersal control [§264.280(a)(5) and (c)(5)]			
I-6	Food crop restrictions [§264.280(a)(6) and (c)(6)]			
I-7	Unsaturated zone monitoring [§264.280(a)(7) and (c)(7)]			
I-8	Establishment of vegetative cover [§264.280(a)(8) and (c)(2)]			
J	Ignitable or Reactive Wastes Provision [§264.281]			
K	Incompatible Wastes Provision [§264.282]			
L	Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027 [§264.283]			

		Provided (Y/N) or NA	Location	Comments
VIII	LANDFILLS			
A	Design and Operations - General [§264.301]			
A-1	Staging plan	____	_____	_____
A-2	Excavation procedures	____	_____	_____
B	Liner System* [§§264.301(a) and (c), 264.303]			
+B-1	Description of liner system	____	_____	_____
+B-2	Synthetic liner	____	_____	_____
	o synthetic liner material, thickness and manufacturer	____	_____	_____
	o synthetic liner bedding	____	_____	_____
	o synthetic liner installation procedures, including seaming	____	_____	_____
	o inspection and quality assurance program during installation	____	_____	_____
	o exposure prevention	____	_____	_____
+B-3	Soil liner	____	_____	_____
	o soil liner thickness and material specifications	____	_____	_____
	o soil liner construction procedures	____	_____	_____
	o construction inspection and monitoring program	____	_____	_____
+B-4	Leachate collection/detection system	____	_____	_____
	o design description	____	_____	_____
	o material specifications	____	_____	_____
	o leachate head restriction	____	_____	_____
	o installation procedures	____	_____	_____
	o inspection and monitoring procedures during installation	____	_____	_____
+B-5	Liner system foundation preparation	____	_____	_____

*Note: Some sites may be exempt from the liner system requirements or may have modified liner requirements.

		Provided (Y/N) or NA	Location	Comments
B-6	Maintenance procedures			
	o maintenance of leachate collection detection system			
	o liner repairs			
C	Run-on Control [§264.301(f)]			
+D	Runoff Control System [§264.301(g)]			
E	Run-off Management Facilities [§264.301(h)]			
F	Procedures to Control Wind Dispersal [§264.301(i)]			
G	Surveying and Recordkeeping [§264.309]			
H	Special Requirements for Ignitable or Reactive Wastes [§264.312]			
+I	Restrictions Against Free Liquids [§264.314]			
I-1	Procedures to treat or stabilize wastes to eliminate free liquids[§264.314(a)]			
I-2	Elimination of free liquids in containers [§264.314(b)]			
J	Containerized Wastes [§264.315]			
J-1	Lab packs [§264.316]			
K	Special Requirements for Hazardous Wastes F020, F021, F022, F023, F026, and F027 [§264.317]			
L	Landfill Closure [§264.310]			
L-1	Stabilization of wastes (including removal of liquids)			
L-2	Final cover [§264.310(a)]			
+L-2a	cover design			
L-2b	material specifications			
L-2c	construction specifications and construction inspection program			

		Provided (Y/N) or NA	Location	Comments
M	Post-Closure Plan* [§264.310(b)]			
M-1	Inspection program [§264.310(b)]	____	_____	_____
	o cover	____	_____	_____
	o run-on and runoff control structures	____	_____	_____
	o groundwater monitoring system	____	_____	_____
M-2	Maintenance program [§264.310(b)]	____	_____	_____
	o cover	____	_____	_____
	o groundwater monitoring system	____	_____	_____
	o run-on/runoff control system	____	_____	_____
	o surveyed benchmarks	____	_____	_____
	o leachate detection/collection system	____	_____	_____
M-3	Continued operation of leachate detection/ collection system [§264.310(c)]	____	_____	_____
M-4	Groundwater monitoring program [§264.310(b)(4)] - See Section XI of checklist	____	_____	_____

*Note Item K): Not all post-closure plan items will be applicable to all situations.

		Provided (Y/N) or NA	Location	Comments
IX	INCINERATION			
A	Construction (new facilities) or Maintenance (existing facilities) [§264.343]			
	o incinerator plans and specifications	____	_____	_____
	o manufacturer's name and model number	____	_____	_____
	o type of incinerator	____	_____	_____
	o liner dimensions of incinerator unit including cross-sectional area of combustion chamber	____	_____	_____
	o description of auxiliary fuel system (type/feed)	____	_____	_____
	o capacity of prime mover	____	_____	_____
	o description of automatic waste feed cut-off system(s)	____	_____	_____
	o stack gas monitoring (CO) and pollution control equipment	____	_____	_____
	o nozzle and burner design	____	_____	_____
	o construction materials	____	_____	_____
	o location and description of temperature, pressure, and flow indicating devices and control devices	____	_____	_____
	o Compliance with certification of construction or modification	____	_____	_____
B	Performance Standards [§264.343]			
B-1	DRE for each POHC in the permit [§264.343(a)]	____	_____	_____
B-1a	99.99 percent DRE of Part 261 Appendix VIII constituents [§264.343(a)(1)]	____	_____	_____
B-1b	99.9999 percent DRE of listed wastes F020, F021, F022, F023, F026, and F027 [§264.343(a)(2)]	____	_____	_____
B-1c	notification of intent to incinerate wastes F020, F021, F022, F023, F026, and F027 [§264.343(a)(2)]	____	_____	_____
B-2	Hydrogen chloride removal [§264.343(b)]	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
B-3	Particulate matter removal [§264.343(c)]			
B-4	Relation of operating conditions to performance standards [§264.343(d)]			
+C	Limitation on Wastes* [§264.344(a)]			
C-1	Option 1 (physical and chemical characteristics of each waste)			
C-2	Option 2 (list of allowable wastes)			
+D	Operating Conditions for Each Waste Feed* [§264.345]			
D-1	Stack gas carbon monoxide level [§264.345(b)(1)]			
D-2	Combustion temperature [§264.345(b)(2)]			
D-3	Indicator(s) of combustion gas velocity [§264.345(b)(3)]			
D-4	Air pollution control system operating conditions related to HCl and particulate standards [§264.345(b)(6)]			
D-5	Precluded waste feed during start-ups, shutdowns, and upsets [§264.345(c)]			
D-6	Fugitive emissions control [§264.345(d)]			
+D-7	Waste feed cut-off [§264.345(e)]			
D-8	Cessation of operation [§264.345(f)]			
+E	Monitoring* [§264.347]			
E-1	Monitoring system and purpose (i.e., must include combustion temperature, waste feed rate, indicator(s) of combustion gas velocity, and stack gas carbon monoxide level; monitoring systems for each specified operating condition must be provided) [§264.347(a)]			
E-2	Frequency of monitoring for each system (e.g., continuous monitoring of combustion temperature) [§264.347(a)]			

*Note: Items C through G are given in the permit for the pre-trial burn skakedown period, the trial burn, the post-trial burn period, and the normal operating period.

		Provided (Y/N) or NA	Location	Comments
E-3	Frequency of testing for each system [§264.347(a)]	____	_____	_____
E-4	Frequency of calibration for each system [§264.347(a)]	____	_____	_____
F	Sampling and Analysis of Wastes and Exhaust Emissions upon Request of Regional Administrator* [§264.347(a)(3)]	____	_____	_____
G	Record and Maintain Monitoring and Inspection Data* [§264.347(d)]	____	_____	_____
H	Trial Burn [§264.344, 270.62]			
H-1	Shakedown period [§§264.344(c)(1), 270.62(a)]	____	_____	_____
	o duration of shakedown period (less than or equal to 720 hours, 1 extension of 720 hours)	____	_____	_____
+H-2	Trial burn period [§§270.19(b), 270.62(b)]			
H-2a	trial burn plan	____	_____	_____
	o analysis of each waste	____	_____	_____
	o engineering description of incinerator	____	_____	_____
	o sampling, analysis and monitoring procedures, including QA/QC plan	____	_____	_____
	o trial burn schedule	____	_____	_____
	o test protocols	____	_____	_____
	o emissions control equipment description and operating conditions	____	_____	_____
	o emergency shutdown procedures	____	_____	_____
	o identification of sources of fugitive emissions	____	_____	_____
	o measurement of operating conditions (e.g., temperature, CO, etc.)	____	_____	_____
H-2b	trial burn POHC's for each waste	____	_____	_____
H-2c	trial burn determinations	____	_____	_____

*Note: Items C through G are given in the permit for the pre-trial burn skakedown period, the trial burn, the post-trial burn period, and the normal operating period.

		Provided (Y/N) or NA	Location	Comments
H-2d	trial burn submissions (data and certification)	_____	_____	_____
H-3	Duration of Post Trial Burn Period [§§264.344(c)(3), 270.62(c)]	_____	_____	_____

		Provided (Y/N) or NA	Location	Comments
X	GROUNDWATER MONITORING - DETECTION MONITORING PROGRAM [§§264.98, 270.14(c)(6)]			
+A	Indicator Parameters, Waste Constituents, Reaction Products to be Monitored [§§264.98(a), 270.14(c)(6)(i)]			
+B	Description of Wells [§§264.98(b), 270.14(c)(6)(ii)]			
C	Background Values [§§264.98(c), 270.14(c)(6)(iii)]			
C-1	Data currently available, or			
C-2	Plan for establishing groundwater quality data			
C-2a	well location			
C-2b	sampling frequency			
C-2c	sampling quantity			
C-2d	background values			
D	Sampling, Analysis and Statistical Procedures [§§264.98(c)/(d)/(f), 270.14(c)(6)(iv)]			
+D-1	Sample collection			
D-2	Sample preservation and shipment			
D-3	Analytical procedure			
D-4	Detection limits			
D-5	Chain of custody			
D-6	Additional requirements for compliance point monitoring [§264.98(d)]			
D-6a	sampling frequency			
D-6b	compliance point groundwater quality values			
D-7	Annual determination [§264.98(e)]			
D-8	Statistical determination			
+D-8a	statistical procedure [§264.98(g)]			
D-8b	results [§264.98h)]			

		Provided (Y/N) or NA	Location	Comments
XI	GROUNDWATER MONITORING - COMPLIANCE MONITORING PROGRAM [§§270.14(c)(7), 264.99]			
+A	Hazardous Constituents to be Monitored [§§264.99, 270.14(c)(7)(iii)]			
+A-1	Concentration limits, or	____	_____	_____
A-2	Alternate concentration limits	____	_____	_____
+B	Description of Wells [§270.14(c)(7)(v)	____	_____	_____
C	Background Values [§§270.14(c)(7)(vi), 264.97(g)]			
C-1	Data currently available, or	____	_____	_____
C-2	Plan for establishing groundwater quality data	____	_____	_____
C-2a	well location	____	_____	_____
C-2b	sampling frequency	____	_____	_____
C-2c	sampling quantity	____	_____	_____
D	Sampling, Analysis and Statistical Procedures [§270.14(c)(7)(vi)]			
+D-1	Sample collection	____	_____	_____
D-2	Sample preservation and shipment	____	_____	_____
D-3	Analytical procedure	____	_____	_____
D-4	Detection limits	____	_____	_____
D-5	Additional requirements for compliance point monitoring	____	_____	_____
D-5a	sampling frequency	____	_____	_____
D-5b	testing for Appendix VIII hazardous constituents	____	_____	_____
D-6	Annual determination	____	_____	_____
D-7	Statistical determination	____	_____	_____
+D-7a	statistical procedure	____	_____	_____
D-7b	results	____	_____	_____

		Provided (Y/N) or NA	Location	Comments
XII	GROUNDWATER MONITORING - CORRECTIVE ACTION PROGRAM [§§270.14(c)(8), 264.100]			
+A	Concentration Limits [§270.14(c)(8)(ii)]			
B	Alternate Concentration Limits [§§264.94, 270.14(c)(8)]			
C	Corrective Action Plan [§270.14(c)(8)(iii)]			
C-1	Location			
C-2	Construction detail			
C-3	Plans for removing wastes			
C-4	Treatment technologies			
C-5	Reinjection system			
C-6	Operation and maintenance			
C-7	Closure and post-closure plans			
+D	Description of wells [§§270.14(c)(7)(v) and (8)(iv)]			
E	Background values [§§270.14(c)(8), 264.97(g)]			
E-1	data currently available, or			
E-2	plan for establishing groundwater quality data			
	o background data			
	o well location			
	o sampling frequency			
	o sampling quantity			
F	Sampling, Analysis and Statistical Procedures [§§270.14(c)(8), 264.99(g), (h)]			
+F-1	Sample collection			
F-2	Sample preservation and shipment			
F-3	Analytical procedure			
F-4	Chain of custody			

		Provided (Y/N) or NA	Location	Comments
F-5	Additional requirements for compliance point monitoring	____	_____	_____
F-5a	sampling frequency	____	_____	_____
F-5b	testing for Appendix VIII hazardous constituents	____	_____	_____
F-6	Annual determination	____	_____	_____
+F-7	Statistical determination	____	_____	_____
F-8	Results	____	_____	_____

RCRA PERMIT QUALITY PROTOCOL

PART 4. PERMIT CONDITION EVALUATION GUIDANCE

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Some permits contain a compliance schedule. The compliance schedule must identify specific tasks to be completed and the timeframe for completing each task (40 CFR 270.33).	Technical Soundness Compliance schedules must identify specific steps or tasks that the permittee must complete in order to bring the facility into compliance with Part 264. Milestone dates must be provided to enable EPA or the State to monitor the permittee's progress. Enforceability The permit must require the permittee to submit progress reports within 14 days following each interim milestone date and the final date of compliance. This condition must appear in the Standard Conditions whenever a permit incorporates a compliance schedule.		

Effective
June 30, 1983

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
When appropriate, the permit must specify the documents to be submitted prior to operation of the facility and the schedule for submitting them (40 CFR 270.30, 270.32 and 270.33).	Technical Soundness When appropriate, the permit must specify the documents to be submitted prior to operation of the facility or of specific units. Such documents may include as-built plans, chemical and physical characterization of wastes, etc. The permit also must establish a schedule for submission of each document. Enforceability The permit condition(s) must clearly state the documents to be submitted, and must specify a date for each submittal.		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The general inspection schedule appended to the permit identifies the general facility items to be inspected, the problems for which these items are to be inspected, and the frequency of inspections (40 CFR 264.15(b) and (c)).	Technical Soundness The general inspection schedule must include the following items, as applicable: o monitoring equipment o safety and emergency equipment o security devices o operating/structural equipment o loading/unloading areas It must identify specific problems to be looked for during the inspection of each item and a specific frequency for inspecting each item. For example, an inspection frequency of "semi-annually" is appropriate, while a frequency of "as used" is inappropriate because it defeats the inspection objective of preventative detection of hazards. The permit also must specify the specific remedies to be implemented when inspections disclose problems. Enforceability The permit must specify that the permittee conduct inspections in accordance with the inspection schedule. It also must specify that the permittee record these inspections in a log which is available for examination by agency personnel.		

Effective
January 31, 1985

II GENERAL FACILITY CONDITIONS
E General Inspection Requirements
E-3 Tank storage/treatment areas
E-3f schedule and procedure for assessing tank condition

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The inspection schedule appended to the permit must specify the procedures to be followed for periodically emptying and inspecting the interior of tanks (40 CFR 264.194(b)).	Technical Soundness The inspection schedule for tanks must include a procedure for emptying them periodically and inspecting their interiors for cracks, leaks, corrosion or erosion, or wall thinning. The procedure must identify how each tank will be emptied, where the waste will be temporarily stored, and how each tank will be cleaned and vented to prepare it for inspection. The procedure also must describe the equipment to be used during the inspection, the items to be inspected, and the problems for which each item is to be inspected. In addition, the procedure must address protection of the personnel inspecting the tank interiors, including testing of air quality, adequate lighting, appropriate protective clothing, and standby equipment and services. Enforceability The permit will require the permittee to inspect the tank interiors in accordance with these procedures and to record the inspection results in a log, which is available for examination by agency personnel.	PWGD-HW Tanks pp. 8-7, 8-10	

Effective
January 12, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The inspection schedule appended to the permit must describe the procedures for inspecting surface impoundment overtopping controls, content levels, leak detection systems, and dikes (40 CFR 264.226(b)).	Technical Soundness In addition to the four items specified in section 264.226(b), the inspection schedule must include soil layers protecting synthetic liners from sunlight, wind, and machinery used to remove sludge from the impoundment. The inspection schedule must include a procedure for inspecting each of the items. In particular, the procedure for thoroughly inspecting the impoundment dikes must be described. It must include the following: o cracks and erosion o settlement, depressions, or sink holes o evidence of movement o seepage and damp areas o animal burrows, trees, and brush growth o spillway obstruction or deterioration Enforceability The permit will require the permittee to inspect the surface impoundments in accordance with this procedure and to document the inspection results in a log, which is available for examination by the agency.	PAGM-GFS PAGM pp. 5-42, 5-43	

Effective
January 31, 1985

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
If the facility is located within a 100-year floodplain, the permit must specify flood protection or a flood plan as per 40 CFR 270.14(b)(11) and 264.18(b). These criteria are for review of flood protection. Flood plan review is contained on the following page.	Technical Soundness The administrative record must contain the necessary documentation supporting the design of devices to protect the facility from washout during a 100-year recurrence interval flood. The source of 100-year flood data must be stipulated. This data must be obtained from a Federal Emergency Management Agency (FEMA), Federal Insurance Administration (FIA), Flood Insurance Study (FIS) or equivalent analytical and mapping procedures. The record may include an engineering report and drawings for the design of flood protection devices. An engineering analysis of the various hydrodynamic and hydrostatic forces resulting from a 100-year flood must be provided. The design of the flood protection devices must provide engineering information demonstrating that these devices will prevent facility washout from the 100-year flood. In addition, the record must contain some form of documentation showing that the agency conducted a technical review of the flood protection devices. Enforceability The permit must require certification by a professional engineer that flood protection devices are constructed as designed as per 40 CFR 270.30(k)(2). The permit must include a written inspection plan and schedule to be followed as per 40 CFR 264.15. In addition, the permit must require that records be maintained of all inspections and repairs or corrective actions for the life of the facility.	PAGM-GFS pp. 5-142 & 5-143 PWGM-CLAEAR pp. 2-12 to 2-18 pp. 3-5 to 3-8 PWGM pp. 4-5	

Effective
January 12, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
If the facility is located within a 100-year floodplain, the permit must specify flood protection or a flood plan as per 40 CFR 270.14(b)(11) and 264.18(b). These criteria are for review of a flood plan.	Technical Soundness The administrative record must contain the necessary documentation supporting a facility flood plan. A flood plan consists of formulated procedures to safely remove hazardous wastes from a flood prone facility, before flood waters can reach the facility, to an eligible facility at a location that is not vulnerable to flood waters. The plan must specify a schedule of activities required to move the hazardous wastes. The schedule must include the time allowed for each activity. Timing of activities is to be based on relative flood levels. The plan must specify the equipment and personnel to be used to move hazardous wastes. The plan must also describe the location the wastes will be moved to and demonstrate that those facilities are eligible to receive hazardous wastes. Enforceability These conditions are enforceable through the agency's enforcement inspection program.	PAGM-GFS pp. 5-142 & 5-143 PWGM-CLAEAR pp. 2-12 to 2-18 pp. 3-5 to 3-8	

Effective
January 12, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The contingency plan appended to the permit must contain specific procedures for responding to leaking tanks (40 CFR 264.194(c)) and sudden drops in the contents of a surface impoundment (40 CFR 264/277(c)).	Technical Soundness The contingency plan must contain specific procedures for responding to leaking tanks and surface impoundment failures. The tank procedures must address removal of leaked or spilled waste, including temporary storage of waste removed from the tanks. A general procedure for assessing the nature and extent of tank damage and determining the appropriate repair mechanism must be included. The surface impoundment procedures must address the following: o Stopping waste addition to the impoundment o Containing leakage o Stopping the leak o Preventing catastrophic failure The procedures for emptying the impoundment must address the rate of liquid removal and temporary storage of the impoundment's contents. Note that the recommended rate of liquid removal is one foot per day to prevent dike failure. Enforceability The permit will require the permittee to maintain the Contingency Plan on-site and to implement its procedures when necessary. The permittee also is required to file a report with the Regional Administrator when the Contingency Plan is implemented.	PAGM pp. 5-48 to 5-50	

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The container storage area design plans and specifications attached to the permit must comply with §264.175. They must specifically address or show via design drawings: o the base or liner material o containment system capacity o design features for drainage of leaks and spills o prevention of run-on	Technical Soundness The design plans must specify the material of which the base of the storage area is constructed (usually concrete) or lined. It must be sufficiently impervious to contain spills, leaks or precipitation. For existing storage areas, a pre-permitting inspection must confirm that all cracks, gaps and construction joints are sealed. The design specifications for new storage areas must specify that construction joints will be sealed.	PWGD-Containers pp. 4-14 to 4-16	
	The containment system must have sufficient capacity to contain 10 percent of the volume of containers, or the volume of the largest container, whichever is greater (§264.175(b)(3)). Containers that do not contain free liquids need not be considered. The permit application must contain calculations demonstrating the required capacity. The administrative record must contain some type of documentation that the calculations were checked during technical evaluation of the application. If containers are not elevated on pallets or other device, the design plans must specify a sloped base or other design feature so that leaks, spills and precipitation will drain off (usually to a collection sump). The procedures for and timing of removal of liquids from the collection sump must be specified in the permit. This generally will include a procedure for determining if the accumulated liquid is hazardous.	PWGD-Containers pp. 4-12 to 4-15	
	The design plans and drawings must show that the containment system is elevated above grade or is protected from run-on by a wall or other feature. If no protection from run-on is shown, the containment system must have sufficient extra capacity to contain run-on. That is, water must not be allowed to flow into, through and then out of the storage area. If the facility does not have a roof with sufficient overhang or sides to prevent accumulation of precipitation then additional secondary containment for rainfall from a 24-hour, 25-year storm event must be provided.	PWGD-Containers pp. 4-16 to 4-17	

Effective
November 6, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

Enforceability

In the case of a new container storage area, the permit must contain a condition requiring that an engineer certify that the facility was constructed in accordance with the design plans, and that the certification be submitted to the agency at the completion of construction.

The permit must also contain a condition requiring that cracks or gaps which may develop in the base or liner will be sealed or appropriately repaired. This should be clearly stated in the inspection schedule required by 40 CFR 264.15.

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Where incompatible wastes are stored, the permit must specify special design and operating features to prevent leaks of incompatible materials from comingling (see §264.177).	Technical Soundness The administrative record must document that, during technical evaluation of the permit application, an agency representative either determined waste incompatibilities or verified the applicant's assessment of waste incompatibilities. When determining if incompatibles exist, the applicant must not only look at the hazardous wastes themselves, but also must consider any materials stored nearby. Each area for compatible hazardous waste storage must provide secondary containment for the containers stored in that area. The most common method of meeting the requirements of §264.177 is the division of the container storage area into two or more cells separated by a wall, curb or other device. This must be shown clearly on the design drawings, with the cells labeled. There must be a permit condition specifying the specific wastes to be placed in each cell. Where there is no design feature (e.g. wall, curb) to positively separate areas containing incompatible wastes, a permit condition specifying that containers holding incompatible wastes be placed in overpack drums is often included in the permit. The permit also must contain a condition specifying that a hazardous waste cannot be placed in an unwashed container previously holding an incompatible waste or material. Enforceability These conditions are generally enforced through certification of construction by a registered engineer and continued inspection of the facility by the agency.	PWGD-Containers pp. 4-11 to 4-12	

Effective
January 12, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
As per §264.191 the permit must specify a minimum tank shell thickness. The permit condition must state that when that shell thickness is reached (as a result of corrosion, erosion, etc.) the tank must be taken out of service.	Technical Soundness The major determinants of required shell thickness for structural integrity of a tank are the tank size and shell material and the nature and specific gravity of the tank contents. The permit application must contain a determination of required shell thickness based on these parameters. The required shell thickness can be determined by several methods. The most common is the application of a code or design standard. If an applicant has obtained required shell thickness from a code, such as API (American Petroleum Institute) 650, API 620 or ASTM D3299, the administrative record must contain documentation that a reviewer determined that the proper code was used and that the code was properly applied. Alternatively, standard formulas can be used to compute required shell thickness based on structural criteria. These are generally applicable to metal tanks. If the applicant computed shell thickness using standard formulas, the administrative record must show that a reviewer has verified those computations. When permitting existing tanks, the current, actual shell thickness of each tank must be determined prior to the issuance of a draft permit. Those data must be included in the Part B permit application. Enforceability The tank inspection schedule in the permit must require periodic (annual, etc.) shell thickness testing by ultrasound or other non-destructive testing methods. Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM-HW Tanks Chapters 3 & 4 Tank Guidance Memo	

Effective
January 12, 1981

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must describe dike design specifications including erosion protection as per 40 CFR 270.17(b)(3) and 264.221(d).	Technical Soundness The administrative record must contain an engineering report and drawings supporting dike design specifications including erosion protection. Dikes must be designed with sufficient structural integrity to prevent massive failure. The following elements must be incorporated in the dike design: o foundation conditions o embankment materials o impoundment liner o waste material Long-term effects of external factors such as frost, wind, rain, temperature, vegetation, etc., must be evaluated. Dike stability assessments must be conducted assuming no functional liner. Information on dike integrity must include: o design plans, technical specifications and schedules o results of field and laboratory investigations of strength, compressibility, Atterberg limits, etc., for foundation and dike materials o data on geologic, hydrogeologic, and hydrologic conditions including groundwater levels, bedrock conditions, and seismic setting o slope stability and failure assessments for various loading conditions including rapid drawdown, partial pool, steady state seepage, earthquakes, foundation soil bearing failure, failure of dike slopes, or failure of drainage systems, covers, or liners o erosion potential from rainfall, surface water runoff, leakage through dikes, and contact with wastes	PWGM pp. 6-78 to 6-85 PAGM pp. 5-27 to 5-32 PWGM pp. 6-133 & 6-134 PAGM pp. 5-45 to 5-48	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	o evaluation of liquification tendencies o evaluation of seismic effects All references, analytical methods, computer models, and field and laboratory test data must be identified. In addition, the record must show via calculations, notes or other date that a technical review was conducted on the dike design specifications. Enforceability The permit must include a certification by a qualified engineer which attests to the structural integrity of the dike as per 40 CFR 270.17(e).		

REGULATORY REQUIREMENT

The permit must specify the design of hydraulic features to prevent impoundment overtopping as per 40 CFR 264.221(c). The design may incorporate hydraulic features, such as channels, spillways, pipes, pumps, etc., to be operated either manually or automatically.

EVALUATION CRITERIA

Technical Soundness

The administrative record must contain an engineering report and drawings having the necessary documentation supporting the design of all hydraulic features to prevent overtopping. Report and drawing information should include the size and capacity calculations of all hydraulic structures such as pumps, pipes, weirs, principal and emergency spillways, channels, reservoir level controllers, etc. The impoundment, including appurtenant hydraulic structures, must be designed to prevent overtopping from a 100-year, 24-hour storm event. A table or graph correlating reservoir storage and elevation may be provided.

The magnitude of the 100-year, 24-hour storm must be determined using data from the U.S. Weather Bureau Technical Publication 40 or other acceptable data. In the event that runoff from the surrounding area enters the impoundment, calculations must be provided for the peak discharge and/or volume resulting from a 100-year, 24-hour storm event.

If foolproof overtopping controls are not employed, the administrative record must contain a water balance study for the life of the impoundment. The study must verify that the impoundment will not be overtopped during normal operations and the 100-year, 24-hour storm event. The study may involve normal inflow and outflow volumes, evaporation, the 100-year, 24-hour storm runoff volume, and freeboard.

The impoundment design must include run-on control through either inclusion of run-on volumes within the impoundment or diversion of run-on from the impoundment. Wind effects on the impoundment must be calculated in accordance with U.S. Bureau of Reclamation "Design of Small Dams," U.S. Army Corps of Engineers ETL 1110-2-221 "Wave Runup and Wind Setup on Reservoir Embankments," or other acceptable procedures. The administrative record must provide documentation (e.g., calculations, notes) that the surface impoundment is operated and designed to prevent overtopping.

REFERENCES

PAGM
pp. 5-24 to 5-27

PWGM
pp. 6-64 to 6-77

PAGM
pp. 5-37
pp. 5-42 to 5-44

FINDINGS/COMMENTS

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	In addition, the record must show that a technical review was conducted on the design of the impoundment and all appurtenant structures. Enforceability The permit must specify the monitoring and inspection plan to be followed during construction as per 40 CFR 270.17(d) and include an inspection plan to be followed during impoundment operation as per 40 CFR 226(b). The operation inspection plan must specify that the impoundment and all hydraulic structures be inspected weekly and after storms and earthquakes. The permit must also stipulate that records be maintained of all inspections. Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Except as noted, the permit must contain a description of a double liner system to be installed at the site. Included with the description must be a design drawing of the system [§264.221].	Technical Soundness Exceptions: a) No liner system is required for existing units (40 CFR 264.221), except that all sites must be retrofitted with a double liner system by November 8, 1988 or closed. b) An exemption from the double liner system requirements can be granted for alternative designs. c) Other exemptions and exceptions as outlined in guidance memo. The permit must contain a description of the double liner system. The double liner system should consist of the following: o top flexible membrane liner o leachate detection system, with provisions for collection of any leakage o bottom liner consisting of a soil liner at least 3 feet thick or a 3-foot-thick soil liner directly beneath a second flexible membrane liner. Documentation would include drawings showing the areal extent of the liner system with a detailed cross-sectional drawing of the liner system. To be exempt under the existing portion rule, the administrative record must include documentation of the extent of the existing portion in the form of a drawing and written description. In addition, the record must indicate the dates when the facility was constructed and waste was placed. Other exemptions and the required documentation are complex. Therefore refer to the noted reference or to current guidance from Headquarters. These exemptions could consist of an exemption from the double liner requirement (i.e., only use a single liner or no liner at all) and are based on site-specific design and/or operating procedures. To be granted, these other exemptions will require extensive documentation along with a	HSWA Liner Memo	

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

detailed technical review. The administrative record must contain documentation of that review and a notification of the approval of exemption by the RA. Finally, the permit fact sheet should include a justification of the exemption.

Double liner systems installed by the operator prior to permit issuance which meet the requirements may fall under the good faith compliance rule and may not need to be replaced; see guidance.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 226(a).

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain flexible membrane liner specifications. Each surface impoundment unit, except for exempt units (see D-1) is required to have two or more liners [§§264.221(a) and (c)].	Technical Soundness Guidance requires that at least one of the liners be a flexible membrane liner. The permit may indicate the brand name and manufacturer of the flexible membrane liner. In most cases a detailed material specification of more than one specific liner will be provided with a note that the final selection will be made at the time of installation subject to final approval of the RA. The permit must indicate that the double liner system will consist of a top flexible membrane liner that is at least 30 mils thick and is compatible with the waste and leachate. In addition, unless documentation is provided in the administrative record that the soil liner is thick enough to contain the leachate (see Section D-3); the bottom liner must also include a 30 mil or thicker flexible membrane liner. Documentation of flexible membrane liner compatibility should consist of test results from EPA Method 9090 testing of the flexible membrane liner. In some cases other data, such as historical or existing site data, may be used. Documentation of sufficient liner strength should consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the flexible membrane liner along with a comparison of those loads against the strength of the flexible membrane liner as determined by the Method 9090 testing. Finally, the administrative record must contain documentation that all the calculations and data dealing with the flexible membrane liner have been reviewed for technical adequacy and have been accepted. The documentation usually will consist of a checklist or review form indicating that the calculations and data have been checked or reviewed and are acceptable. Also, in some cases verification calculations by the technical reviewer may be provided.	GDLS PWGM pp. 6-11 to 6-61 GDLS pp. 2-8 p. 13 pp. 38-45 SW-846 NSF	

Effective
January 31, 1985

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

V SURFACE IMPOUNDMENTS
C Liner System
C-2 Flexible membrane liner
C-2b flexible membrane liner bedding

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the flexible membrane liner to protect it [§264.221(a)].	Technical Soundness The material must be (SP) material or finer, as classified by the Unified Soil Classification System. Documentation would consist of material specifications for the materials to be used for the layers of the liner system that the flexible membrane liner rests on and that are placed on the flexible membrane liner. In some cases other material will be used for bedding, in which case documentation such as calculations, historical data, or test data must be provided that indicates equivalent protection of the liner. If calculations or test data are provided, the administrative record must contain documentation that the data have been technically reviewed and approved. In some cases no protective layer will be provided for the top flexible membrane liner. In those cases the flexible membrane liner thickness will likely need to be greater than 30 mils. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 16-17 PWGM pp. 6-11 to 6-31	

Effective
July 26, 1982

V SURFACE IMPOUNDMENTS
C Liner System
C-2 Flexible membrane liner
C-2c flexible membrane liner installation procedures, including seaming

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed flexible membrane liner material specifications and installation procedures [§264.221].	Technical Soundness Included within the specifications must be such items as: o liner manufacturer (optional), o liner brand name (optional), o liner thickness, o liner chemical and physical properties, o method of liner field seaming, o method of liner subgrade preparation, o method of anchoring the liner, o handling procedures, and o placement procedures. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	SW-870 pp. 298-305 pp. 345-373 pp. 403-414 GDLS pp. 38-45	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a detailed construction quality assurance program [§264.221].	Technical Soundness The plan must indicate or provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GLDS pp. 38-45 SW-870 pp. 250-253 CQA	

Effective
July 26, 1982

V SURFACE IMPOUNDMENTS
C Liner System
C-2 Flexible membrane liner
C-2e exposure prevention

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the flexible membrane liner from exposure [§264.221].	Technical Soundness Protection is usually provided by placing a cover layer of soil or other material over the flexible membrane liner. If this is not done, or if the flexible membrane liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/thaw, etc., will not harm the liner. The record must include documentation (e.g., notes, calculations) that such data have been technically reviewed and approved. In addition, it is likely that the flexible membrane liner thickness will have to exceed 30 mils. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 6-11 to 6-31	

Effective
July 26, 1982

V SURFACE IMPOUNDMENTS
C Liner System
C-3 Soil liner
C-3a soil liner thickness and material specifications

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for a soil liner. Each surface impoundment unit except for exempt units (see D-1) is required to have a bottom soil liner which is at least 3 feet thick with a permeability of 1×10^{-7} cm/sec or less (§264.221(a) and (c). (Note: If only one flexible membrane liner is present, then the soil liner thickness must be computed.)	Technical Soundness If the bottom liner consists of a flexible membrane liner placed on a soil liner, the soil liner must be at least 3 feet thick with a minimum permeability of 1×10^{-7} cm/sec and the flexible membrane liner must be placed directly on the soil liner. If the bottom liner does not contain a flexible membrane liner component, then the soil liner must be at least 3 feet thick with a minimum permeability of 1×10^{-7} cm/sec and the administrative record must contain calculations which model the soil liner. The model is used to determine the necessary soil liner thickness, and the soil liner must be thick enough so that any leachate generated by the surface impoundment does not flow completely through the soil liner during the active life, closure period, and 30-year post-closure period. When doing the calculations, it must be assumed (as per agency guidance) that the top flexible membrane liner began leaking during the first year of operation. The administrative record must include documentation, such as a checklist or supporting calculations, indicating that the soil liner thickness evaluation has been technically reviewed and accepted. The administrative record must contain documentation (i.e., testing data) that the soil liner is compatible with the leachate expected to be generated at the facility. The administrative record must contain documentation that the soil liner has sufficient strength to resist the loads and stresses placed on it. In some cases the administrative record may contain test data indicating the permeability of the soil proposed for use as the soil liner. Or, the record may indicate that in-place soil is to be amended with bentonite or other material to lower its permeability; in which case, a mix design supported by test data would be provided. If test data are provided, they must include a description of the testing procedures, the test results, and an analysis of the results.	GDLS p. 17 pp. 45-48 SW-869 SW-84-001 SW-925 pp. 29-30	

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July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	The administrative record must contain a checklist, or other documentation, which indicates that the design data have been technically reviewed and were accepted. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner [§264.221].	Technical Soundness Items addressed must include: o removal of rocks, roots and other unsuitable material from the soil, o placed in lifts that are less than 6 inches thick, o requires the breaking up of soil clods if necessary, o proper addition of water if necessary, o not constructed of frozen soil, along with prevention of freezing of compacted material, and o seal-rolling of final lift for smooth surface. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 18-20	

Effective
July 26, 1982

V SURFACE IMPOUNDMENTS
C Liner System
C-3 Soil liner
C-3c construction inspection and monitoring program

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed as per the plans and specifications [§264.226].	Technical Soundness Included must be: o testing of soil material for permeability, classification, and density; o procedures for in-place permeability testing; o inspection of the material during placement and the placement and compaction procedures; o documentation procedures; and o qualifications of the inspectors. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 38-44 CQA	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Each surface impoundment unit, except for exempt units (see D-1) is required to have a leachate detection zone located beneath the top flexible membrane liner and above the bottom liner [§264.221(c)]. The design plans attached to the permit must contain specifications for a leachate detection system.	Technical Soundness The permit must contain the following for the leachate detection system: o A description, including drawings, of the operation and design of the system. o Each portion of the system must have a minimum slope of 2%. o A graded granular filter or filter fabric to prevent clogging of the system is required. o The granular material should have a permeability of 1×10^{-7} cm/sec or greater and must be at least 12 inches thick. o The granular layer may be replaced by an artificial drainage material provided it has equivalent flow capacity. o A drainage tile system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate is required. The administrative record must contain the following for the leachate detection system: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections must be provided. o Data showing the chemical compatibility of all components of the system with the waste and leachate must be provided. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 9-94 through 9-97 of the reference (PWGM). o The record must contain documentation, either with test data or acceptable engineering analysis, of the permeability of the granular material or equivalent capacity of artificial drainage material.	GDLS pp. 4-11 pp. 31-44 PWGM pp. 9-60 to 9-108 SW-869	

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January 31, 1985

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

- The record must include calculations which verify that the pipe sizing and spacing have sufficient capacity.

- The administrative record must contain documentation in the form of engineering analysis that the granular drainage layer is stable under the loads and stresses placed on it.

- Calculations along with material properties which show that all components of the system have sufficient strength to support the loads that they will be subjected to must be provided.

The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case the record must contain calculations and data which show that the designed system has flow capacity equivalent to the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference (GDLS).

The record must also contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed material specifications for all components of the leachate detection system [§264.221].	Technical Soundness Included must be such items as applicable: o pipe specifications, o granular material gradations, o artificial drainage material specifications, o pump specifications, and o sump specifications. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 39-44	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate detection system [§264.221].	Technical Soundness The construction specifications should address the following procedures. o pipe placement procedures, o protection of the liners during placement of the systems, o construction procedures for the sumps, and o placement of the granular material and filters. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 39-44	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces which could result in liner failure due to settlement, compression, or uplift [§264.221(a)].	Technical Soundness The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that it has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analyses are included in the reference. Items which must generally be included are items normally included in the documentation in support of liner foundation design and to demonstrate sufficient strength include the following. o test boring information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis, and landfill slope analysis; and o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential. The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. The necessary items are very site specific, but are discussed in general in the references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.226(a).	GDLS pp. 39-44 PWGM pp. 6-46 to 6-58 CQA	

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July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1a description of liner system

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Except as noted, the permit must contain a description of a liner system to be installed at the site. Included with the description must be a design drawing of the system (40 CFR 264.251).	Technical Soundness Exceptions: a) No liner system is required for existing units (40 CFR 264.251). b) No liner system is required for enclosed dry piles (40 CFR 264.250). c) Sites which have been based on site conditions or alternative design. d) Other exemptions and exceptions as outlined in guidance memo. The permit must contain a description of the liner system. The liner system must consist of the following: o leachate collection system o synthetic or soil liner Documentation would include drawings showing the aerial extent of the liner system with a detailed cross-sectional drawing of the liner system. To be exempt under the existing portion rule, the administrative record must include documentation of the extent of the existing portion in the form of a drawing and written description. To be exempt under the enclosed dry pile, the administrative record must include documentation (e.g., testing data, design plans, specifications) verifying the following (40 CFR 264.250(c)): o liquids or wastes containing free liquids are not placed in the pile, o the pile is inside a structure which prevents run-on, o wind dispersal control is by other means than wetting, o the waste in the pile does not generate leachate.	WPDLS PWGM pp. 7-9 to 7-51	

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REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

Other exemptions and the required documentation are complex and only in draft form as this is prepared. Therefore refer to the noted reference or to current guidance from Headquarters.

Some liner systems installed by the operator which do not meet the requirements could fall under the good faith compliance rule and do not need to be replaced; see guidance.

Enforceability

New construction must be certified by a registered engineer; and that certification must be submitted to the agency. The requirement to maintain the facility as it is depicted in the plans and specifications is enforced through the agency's enforcement inspection program.

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1b synthetic liner
o synthetic liner material, thickness, and manufacturer

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Each waste pile unit, except for exempt units (see B-1) is required to have a liner. The permit must specify the liner material, thickness and manufacturer (40 CFR 264.251(a)(1)).	Technical Soundness If the liner is a synthetic liner, the permit must indicate the brand name and manufacturer of the synthetic liner. In most cases more than one will be provided with a note that the final selection will be made at the time of installation subject to final approval of the RA. The permit must indicate that the synthetic liner must be at least 30 mils thick and that it is compatible with the waste and leachate. Documentation of synthetic liner compatibility must generally consist of test results from EPA Method 9090 testing of the synthetic liner. In some very limited cases, other data, such as historical or existing site data, may be used. Documentation of sufficient liner strength must consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the synthetic liner along with a comparison of those loads against the strength of the synthetic liner as determined by the Method 9090 testing. Finally the administrative record must contain documentation that all the calculations and data dealing with the synthetic liner have been reviewed for technical adequacy and have been accepted. The documentation will usually consist of a checklist or review form indicating that the calculations and data have been checked or reviewed and are acceptable. Also, in some cases verification calculations by the technical reviewer may be provided. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 7-16 to 7-51 SW-846 NSF WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1b synthetic liner
o synthetic liner bedding

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the synthetic liner to protect it (40 CFR 264.251(a)(1)).	Technical Soundness The material should be (SP) material or finer, as suggested by the Unified Soil Classification (USGS). Documentation would consist of material specifications for the materials to be used to protect the synthetic liner. In some cases other material will be used for bedding, in which case documentation such as calculations, historical data, or test data must be provided that indicate equivalent protection of the liner. If calculations or test data are provided, the administrative record must contain documentation that the data have been technically reviewed and approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	WPDLS PWGM pp. 7-16 to 7-51	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1b synthetic liner
o synthetic liner installation procedures, including seaming

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed synthetic liner material specifications and installation procedures (40 CFR 264.251(a)(1)).	Technical Soundness Included within the specifications must be such items as: o liner manufacturer, o liner brand name, o liner thickness, o liner chemical and physical properties, o method of liner field seaming, o method of liner subgrade preparation, o method of anchoring the liner, o handling procedures, and o placement procedures. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	SW-870 pp. 298-305 pp. 345-373 pp. 403-414 PWGM pp. 7-16 to 7-51 WPDLS	

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VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1b synthetic liner
o inspection and quality assurance program during installation

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a detailed construction quality assurance program (40 CFR 264.251(a)(1)).	Technical Soundness The plan must provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	SW-870 pp. 250-253 PWGM pp. 7-16 to 7-51 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1b synthetic liner
o exposure prevention

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the synthetic liner from exposure (§264.251(a)).	Technical Soundness Protection is usually provided by placing a cover layer of soil or other material over the synthetic liner. If this is not done, or if the synthetic liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/ thaw, etc., will not harm the liner. The record must include documentation (e.g., notes, calculations) that such data have been technically reviewed and approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-16 to 7-51 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1c soil liner
o soil liner thickness and material specifications

REGULATORY REQUIREMENT

The permit must contain specifications for a soil liner. Each waste pile unit except for exempt units (see B-1) is required to have a liner. If a soil liner is used, it must be at least 2 feet thick with a permeability of 1x10 cm/sec or less (40 CFR 264.251(a)(1)).

EVALUATION CRITERIA

Technical Soundness

If a soil liner is used, then it must be at least 2 feet thick and the administrative record must contain calculations which model liquid movement through the soil liner. The model is used to determine the necessary soil liner thickness, and the soil liner must be thick enough so that any leachate generated by the waste pile does not flow completely through the soil liner during the active life and closure period. When doing the calculations it must be assumed that the leachate collection system is clogged. The administrative record must include documentation, such as a checklist or supporting calculations, indicating that the soil liner thickness evaluation has been technically reviewed and accepted.

In some cases the administrative record may contain test data indicating the permeability of the soil proposed for use as the soil liner. Or, the record may indicate that in-place soil is to be amended with bentonite or other material to lower its permeability; in which case a mix design supported by test data would be provided. If test data are provided, it must include a description of the testing procedures, the test results, and an analysis of the results. The administrative record must contain a checklist, or other documentation, which indicates that the data has been technically reviewed and was accepted.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).

REFERENCES

WPDLS

SW-869

SW-84-001

SW-925

pp. 29-30

PWGM
pp. 7-9 to 7-51

FINDINGS/COMMENTS

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1c soil liner
o soil liner construction procedures

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner (§264.251)(a)(1)).	Technical Soundness Items addressed must include: o removal of rocks, roots and other unsuitable material from the soil, o placed in lifts that are less than 6 inches thick, o requires the breaking up of soil clods if necessary, o proper addition of water if necessary, o not constructed of frozen soil along with prevention of freezing of compacted material, and o seal-rolling of final lift for smooth surface. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-16 to 7-51 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner system
A-1c soil liner
o construction inspection and monitoring program

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed as per the plans and specifications (§264.254).	Technical Soundness Included must be: o testing of soil material for permeability, classification, and density; o inspection of the material during placement and the placement and compaction procedures; o documentation procedures; and o qualifications of the inspectors. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-16 to 7-51 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1d leachate collection system
o design description

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Each waste pile unit, except for exempt units (see B-1) is required to have a leachate collection system placed above the liner (40 CFR 264.251(a)(2)).	Technical Soundness The permit must contain the following for the leachate collection system: o A description must be provided including drawings of the operation and design of the system. o Each portion of the system must have a minimum slope of 2%. o The layer must be at least 12 inches thick. o A graded granular filter or filter fabric to prevent clogging of the system must be included in the design. o The granular material should have a permeability of 1×10^{-7} cm/sec or greater and must be at least 12 inches thick. o The granular layer may be replaced by an artificial drainage material, provided it has equivalent flow capacity. o A drainage collection system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate is required. The administrative record must contain the following for the leachate collection system: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections must be provided. o Data showing the chemical compatibility of all components of the system with the waste and leachate must be included. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 7-81 through 7-46 of the reference.	PWGM pp. 7-51 to 7-100 SW-869 GDLS pp. 9-10 pp. 35-36 WPDLS	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

- o The record should contain documentation either with test data or acceptable engineering analysis of the permeability of the granular material.

- o The record should include calculations which verify that the pipe sizing and spacing have sufficient capacity.

- o The record should include calculations along with material properties which show that all components of the system have sufficient strength to support the loads that they will be subjected to.

The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case the record must contain calculations and data which show that the alternate system has a flow capacity equivalent to that of the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference.

The record must also contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1d leachate collection system
o material specifications

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed material specifications for all components of the leachate collection system (40 CFR 264.251(a)(2)).	Technical Soundness Included must be such items as applicable: o pipe specifications, o granular material gradations, o pump specifications, and o sump specifications. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1d leachate collection system
o leachate head restriction

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a provision that the maximum leachate in the leachate collection system cannot exceed one foot (40 CFR 264.251(a)(2)).	Technical Soundness The record must contain verified engineering calculations showing that leachate collection system has sufficient capacity to maintain a leachate depth of less than or equal to one foot. A detailed discussion of the necessary calculations is contained on pages 7-55 through 7-62 of the reference. The record also must contain documentation, such as checklists or supporting calculations, indicating that the engineering calculations have been technically reviewed and are approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1d leachate collection system
o installation procedures

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate collection system (40 CFR 264.251(a)(2)).	Technical Soundness Included must be such items as applicable: o pipe placement procedures, o protection of the liners during placement of the systems, o construction procedures for the sumps, and o placement of the granular material and filters. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1d leachate collection system
o inspection and monitoring procedures during installation

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan to assure that the leachate collection system is constructed in accordance with the plans and specifications (40 CFR 264.254).	Technical Soundness Included as applicable must be such items as: o qualifications of the inspectors, o testing procedures, o inspection during placement of the materials, and o documentation procedures. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254(a).	PWGM pp. 7-51 to 7-100 WPDLS	

Effective
July 26, 1982

VI WASTE PILES
A Design and Operating Requirements
A-1 Liner systems
A-1e liner system foundation preparation

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify procedures for liner foundation preparation. The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces which could result in liner failure due to settlement, compression, or uplift (40 CFR 264.251(a)(1)(ii)).	Technical Soundness The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that it has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analyses are included in the reference. Items normally provided in support of the liner foundation design include the following. o test boring information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis; o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential. The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. Here again the necessary items are very site specific but are discussed in general in both references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.254.	PWGM pp. 7-37 to 7-39 WPDLS	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the wastes to be applied to the land treatment unit (40 CFR 1)). 264.271(a)(1)). The permit must specify the hazardous constituents in the wastes that must be degraded, transformed or immobilized (40 CFR 264.271(b)).	Technical Soundness The parameters analyzed must include those listed on Table 2.1 of the PGM-HWLTD along with the Appendix VIII constituents reasonably expected to be in or derived from the wastes to be land treated (Table 2.2 of PGM-HWLTD). The administrative record must include waste analyses to verify the presence of hazardous constituents in the wastes to be land treated. The administration record must contain details of the demonstration waste analysis plan including: o Sampling - The waste must be sampled in accordance with scientific methods to ensure that accurate, representative samples are obtained. o Sample Collection - The waste must be collected and composited to provide samples which are representative of the waste used in the demonstration. o Sample Handling and Storage - The samples must be handled and stored (preserved) to maintain the chemical integrity of the samples until analysis. o Sample Analysis - The method used to analyze the waste must be approved by EPA. The administrative record also must contain documentation (notes, etc.) showing that a technical review of the waste analysis plan was conducted and that consideration was given to the aforementioned details of the plan in determining its technical soundness. Enforceability The permit must include a condition requiring maintenance of records of the wastes applied to the land treatment unit as per 40 CFR 264.73 and 264.279.	HWLT pp. 107-134	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the horizontal and vertical dimensions of the treatment zone (40 CFR 264.271(c)).	Technical Soundness As per 40 CFR 264.271(c), the treatment zone must extend no more than 1.5 meters below the soil surface, and the lower limit of the treatment zone must be at least one meter above the seasonal high table. The administrative record must contain the necessary documentation supporting the depth of the treatment zone. This information must include a soil boring log and the results of all soil sample analyses. These analyses must verify the fact that the depth of the treatment zone does not exceed 1.5 meters below the existing soil surface. Results of studies documenting the depth of the seasonal high water table, including boring logs and depth-to-water table measurements, must be included. These analyses must show that the seasonal high water table is located at least one meter below the lower boundary of the treatment zone. Enforceability The requirement that all treatment take place within the treatment zone is enforced through permit conditions requiring the monitoring and notification activities of 40 CFR 278.	PAGM pp. 7-44 to 7-46	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the types of tests used in the demonstration and the analytical procedures used (40 CFR 264.272(b)).	Technical Soundness The permit must identify the specific laboratory procedures in the subject demonstration. The following items pertaining to laboratory treatment demonstrations should be addressed. o Laboratory Demonstration Methodologies - The permit must include specification of the type of test(s) to be used, and the materials and methods to be employed. The test used must simulate conditions in the land treatment unit including waste loading rates, soil conditions, and climatic conditions. o Analytical Procedures - The permit must include the type of analytical procedures to be used in the analysis of demonstration wastes and soil core and soil-pore liquid samples. This must include the sampling methods, sample handling protocol, and analysis procedures. o Worker Protection - The permit must specify the steps to be taken to ensure worker protection during the laboratory demonstration. This includes such items as safety equipment and emergency plans. In all cases, the demonstration must show that hazardous constituents in the waste can be transformed, immobilized, or degraded. Enforceability The conduct of laboratory demonstrations is enforceable by agency inspection under 40 CFR 270.30(i), and through the recordkeeping requirements of 40 CFR 270.30(j).	PGM-HWLTD pp. 43-59	

Effective
April 1, 1983

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the methods of waste application and incorporation to be employed at the land treatment unit (40 CFR 264.273(a)(1)).	Technical Soundness The administrative record must contain documentation that the method for waste application/ incorporation was selected considering potential variations in climatic conditions and waste composition. Enforceability The method used for waste application/ incorporation can be enforced by agency inspection under 270.30(i)(3).		

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the rate of waste application onto the treatment zone (40 CFR 264.273(a)(1)).	Technical Soundness The administrative record must contain information supporting the waste application rate. The record must contain the applicable results from the land treatment demonstration used in setting the waste loading rates. For each waste to be landtreated, the record must specify the following three constituents: o Rate Limiting Constituent (RLC) - that compound or element which restricts the amount of waste which can be applied per year (kg/ha/yr). o Application Limiting Constituent (ALC) - that compound or element which restricts the amount of waste which can be applied per application (kg/ha/application). o Capacity Limiting Constituent (CLC) - that compound or element which restricts the total amount of waste which can be applied to the soil over the life of the treatment unit (kg/ha). In settling the loading rate, consideration must be given to the following major classes of constituents in the waste: o Organic constituents in terms of their potential for volatilization, leaching, runoff, and degradation o Metals content of the waste from the standpoint of immobilization (or leaching) potential based on the cationic exchange capacity of the soil o Nitrogen and phosphorus content of the waste o Soluble salts content of the waste o Water content of the waste. The record also must contain some form of documentation showing that a technical review was conducted on the proposed loading rate giving consideration to each of the aforementioned items.	HWLT pp. 373-405	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	Enforceability The permit must include a condition requiring maintenance of records of waste application rates, as per 40 CFR 264.279 and 264.73.		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the measures used to control soil pH (40 CFR 264.273(a)(2)).	Technical Soundness The administrative record must contain documentation supporting the measures to control soil pH. This documentation must contain a description and technical verification of the following items related to soil pH control. o Sampling Protocol - The record must include a description of the frequency, location, and sampling and analysis procedures used to determine soil pH. o pH Control Calculations - The record must specify the method used to calculate soil amendments for pH control and must specify the range of pH to be maintained. o pH Control Methods - The record must specify the chemicals to be used to control soil pH and describe how they will be added to the treatment zone. Enforceability Methods to control soil pH (including monitoring requirements) are enforceable by inspection under 40 CFR 270.30(i)(3).	HWLT pp. 465-468, PAGM pp. 7-41	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the measures to enhance microbial and chemical reactions (40 CFR 264.273(a)(3)).	Technical Soundness The administrative record must provide documentation supporting the measures to enhance microbial and chemical reactions. This documentation must contain a description and technical verification of the following items. o Sampling Protocol - The record must include a description of the frequency, location, and sampling and analysis procedures used to determine soil additions to enhance microbial and chemical reactions. o Nutrient Additions - The record must specify the method used to calculate soil amendments and must specify the C:N ratio to be maintained. o Soil Nutrient Control Methods - The record must specify the chemicals to be used to enhance microbial and chemical reactions and describe how they will be added to the treatment zone. Enforceability Methods to enhance microbial and chemical reactions are enforceable by agency inspection under 40 CFR 270.30(i)(3).	HWLT p. 372 PAGM pp. 7-41	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the measures to control soil moisture content in the treatment zone (40 CFR 264.273(a)(4)).	Technical Soundness The administrative record must provide documentation supporting the measures to control soil moisture in the treatment zone. This documentation must include a description of the methods used to monitor soil moisture, the range of soil moisture to be maintained, and the methods to be used to control soil moisture. The record also must contain evidence (e.g., notes, calculations) of a technical review of the above-mentioned items to ensure that the soil moisture control measures proposed are adequate. Enforceability Proper control of soil moisture is enforceable by inspection under 40 CFR 270.30(i)(4).	PAGM pp. 7-41	

Effective
July 26, 1982

VII LAND TREATMENT UNITS
D Design and Operating Procedures
D-6 Run-on/runoff control
o construction to prevent runoff

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify that the unit will be constructed and managed to prevent runoff of hazardous constituents from the treatment zone (40 CFR 264.273(b) and (d) and (e)).	Technical Soundness The permit must contain design plans and drawings for features to control runoff. The administrative record must contain information to demonstrate that the unit construction and operation will prevent runoff of hazardous constituents from the treatment zone. This includes such items as: o Cross-sectional drawings of diversion structures, o Hydrologic analyses to demonstrate that the unit will prevent runoff from a 24-hour, 25-year storm event, o Design specifications of waste water treatment facilities. Of particular importance with respect to documentation of runoff prevention is the presence of a technical review of the information. This technical review must contain a verification of all calculations and specifications used in the design and construction of the runoff prevention structures. Enforceability The runoff prevention structures must be inspected and maintained under 40 CFR 264.273(g)(1).	PAGM pp. 7-46, 49-51 HWLT pp. 425-427	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify an unsaturated zone monitoring plan (40 CFR 264.271(a)(3)). This plan must meet the requirements of 40 CFR 264.278.	Technical Soundness The unsaturated zone monitoring program must be designed to detect the movement of hazardous constituents below the treatment zone. The administrative record must contain extensive documentation relating to the unsaturated zone monitoring plan. The information provided must include specific details on monitoring in the unsaturated zone, including both soil cores and soil-pore liquid. The record must both specify and verify by way of a technical review the following items. o Sampling Locations - The location of soil-pore liquid and soil core samples must be established randomly to ensure representative placement of the samples. Additional "hot spots" such as the toe of slopes also may be selected in addition to the random samples. o Sampling Frequency - Sampling of soil cores must be conducted quarterly; sampling of soil-pore liquid must be conducted quarterly, preferably following leachate generating precipitation. o Analysis Parameters - The parameters to be monitored must consist of the hazardous constituents reasonably expected to be present in the waste or principal hazardous constituents. Principal hazardous constituents are hazardous constituents contained in the waste that are the most difficult to treat. Enforceability The permit must include a provision for reporting of unsaturated zone monitoring results as per 40 CFR 264.278(g).	PGM/UZM-HWLT Chapters 2-4, HWLT pp. 532-544	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for a double liner system. Except as noted, the permit must contain a description of a double liner system to be installed at the site. Included with the description must be a design drawing of the system (40 CFR 264.301(a) and (c)).	Technical Soundness Exceptions: a) No liner system is required for existing units (40 CFR 264.301). b) An exemption from the double liner system requirements can be granted for alternative designs. c) Other exemptions and exceptions as outlined in guidance memo. The permit must contain a description of the double liner system. The double liner system should consist of the following: o top flexible membrane liner o leachate detection system, with provisions for collection of any leakage o bottom liner consisting of a second flexible membrane liner at least 30 mils thick with a 3-foot-thick soil liner directly beneath the second flexible membrane liner. Documentation would include drawings showing the areal extent of the liner system with a detailed cross-sectional drawing of the liner system. To be exempt under the existing portion rule, the administrative record must include documentation of the extent of the existing portion in the form of a drawing and written description. In addition, the record must indicate the dates when the facility was constructed and waste was placed to assure compliance with the dates provided in the agency guidance. Other exemptions, and the required documentation, are complex and currently in draft form. Therefore refer to the noted reference or to current guidance from Headquarters. These exemptions are based on site-specific design and/or operating	HSWA Liner Memo	

Effective
July 15, 1985

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

procedures, and will require extensive documentation along with a detailed technical review. The administrative record must contain documentation of that review and a notification of the approval of the exemption by the RA. Finally, the permit fact sheet should include a justification of the exemption. (No exemptions are allowed in Alabama per 40 CFR 264.332(k).)

Double liner systems installed by the operator which do not meet the requirements could fall under the good faith compliance rule and may not need to be replaced; see guidance.

Enforceability

The permit must contain design plans and specifications for the liner system. The permit also must contain conditions requiring inspection during construction as per 40 CFR 264.303(a) and certification as per 40 CFR 270.30(k)(2).

Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o flexible membrane liner material, thickness, and manufacturer

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Each landfill unit, except for exempt units (see C-1) is required to have two or more liners (40 CFR 264.301(a) and (c)).	Technical Soundness Guidance requires that at least one of the liners be a flexible membrane liner. The permit may indicate the brand name and manufacturer of the flexible membrane liner. In most cases a detailed material specification for more than one specific liner will be provided with a note that the final selection will be made at the time of liner installation, subject to final approval of the RA. The permit must indicate that the double liner system must consist of a top flexible membrane liner that is at least 30 mils thick and that it is compatible with the waste and leachate. In addition, unless documentation is provided in the administrative record that the soil liner is thick enough to contain the leachate (see Section B-3); the bottom liner must also include a 30 mil or thicker flexible membrane liner. Documentation of flexible membrane liner compatibility usually must consist of test results from EPA Method 9090 testing of the flexible membrane liner. In some very limited cases, other data, such as historical or existing site data, may be used. Documentation of sufficient liner strength must consist of calculations computing the loads and stresses, such as operational and construction loads or waste loads, which are applied to the flexible membrane liner along with a comparison of those loads against the strength of the flexible membrane liner as determined by the Method 9090 testing. Finally the administrative record must contain documentation that all the calculations and data dealing with the flexible membrane liner have been reviewed for technical adequacy and have been accepted. The documentation will usually consist of a checklist or review form indicating the calculations and data have been checked or reviewed and are acceptable. Also, in some cases check calculations by the technical reviewer may be provided.	PWGM pp. 9-10 to 9-30 GDLS pp. 2-8 p. 13 pp. 38-45 SW-846 NSF	

Effective
July 15, 1985

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o flexible membrane liner material, thickness, and manufacturer
- Continued -

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o Flexible membrane liner bedding

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a description for the bedding material used both above and below the flexible membrane liner to protect it (40 CFR 264.301).	Technical Soundness The material should be (SP) material or finer, as classified by the Unified Soil Classification System. Documentation would consist of material specifications for the materials to be used for the layers of the liner system that the flexible membrane liner rests on and that are placed on the flexible membrane liner. In some cases, other material will be used for bedding, in which case, documentation such as calculations, historical data, or test data must be provided that indicates equivalent protection of the liner. If calculations or test data are provided, the administrative record must contain documentation that the data have been technically reviewed and approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 16-17 PWGM pp. 9-27	

Effective
July 26, 1982

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o flexible membrane liner installation procedures, including seaming

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed flexible membrane liner material specifications and installation procedures (40 CFR 264.301).	Technical Soundness Included within the specifications must be such items as: o liner manufacturer (optional), o liner brand name (optional), o liner thickness, o liner chemical and physical properties, o method of liner field seaming, o method of liner subgrade preparation, o method of anchoring the liner, o handling procedures, and o placement procedures. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(E)(2) and inspection during construction as per 40 CFR 264.303(a).	SW-870 pp. 298-305 pp. 345-373 pp. 403-414 GDLS pp. 38-45	

Effective
July 26, 1982

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o inspection and quality assurance program during installation

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include a detailed construction quality assurance program (40 CFR 264.301).	Technical Soundness The plan must indicate or provide the following: o qualifications of inspectors, o frequency of inspections, o testing procedures to be used to test the liner seams, and o documentation procedures to be used. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GLDS pp. 38-45 SW-870 pp. 250-253 CQA	

Effective
January 31, 1985

VIII LANDFILLS
B Liner System
B-2 Flexible membrane liner
o exposure prevention

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include provisions for protection of the flexible membrane liner from exposure (40 CFR 264.301).	Technical Soundness Protection usually is provided by placing a cover layer of soil or other material over the flexible membrane liner. If this is not done, or if the flexible membrane liner will be exposed for long periods due to phased construction, then the record must contain test data demonstrating that sunlight, wind, rain, freeze/thaw, etc., will not harm the liner. The record must include documentation that such data have been technically reviewed and approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	PWGM pp. 9-27 to 9-30	

Effective
July 26, 1982

VIII LANDFILLS
B Liner System
B-3 Soil liner
o soil liner thickness and material specifications

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Each landfill unit except for exempt units (see C-1) is required to have a bottom soil liner which is at least 3 feet thick with a permeability of 1×10^{-7} cm/sec or less (40 CFR 264.301(a) and (c)). (Note: If only one flexible membrane liner is present, then the soil liner thickness must be computed.	Technical Soundness If the bottom liner consists of a flexible membrane liner placed on a soil liner, the soil liner must be at least 3 feet thick with a minimum permeability of 1×10^{-7} cm/sec or less and the flexible membrane liner must be placed directly on the soil liner. If the bottom liner does not contain a flexible membrane liner component then the soil liner must be at least 3 feet thick with a minimum permeability of 1×10^{-7} cm/sec or less and the administrative record must contain calculations which model the soil liner. The model is used to determine the necessary soil liner thickness, and the soil liner must be thick enough so that any leachate generated by the landfill does not flow completely through the soil liner during the active life, closure period, and 30-year post-closure period. When doing the calculations, it must be assumed that the top flexible membrane liner began leaking during the first year of operation (as per agency guidance). The administrative record must include documentation, such as a checklist or supporting calculations, indicating that the soil liner thickness evaluation has been technically reviewed and accepted. The administrative record must contain documentation that the soil liner is compatible with the leachate expected to be generated at the facility. The record also must contain documentation that the soil liner has sufficient strength to resist the loads and stresses placed on it. In some cases the administrative record may contain test data indicating the permeability of the soil proposed for use as the soil liner. Or, the record may indicate that in-place soil is to be amended with bentonite or other material to lower its permeability; in which case, a mix design supported by test data would be provided. If test data are provided, they must include a description of the testing procedures, the test results, and an analysis of the results.	GDLS p. 17 pp. 45-48 SW-869 SW-84-001 SW-925 pp. 29-30	

Effective
January 31, 1985

VIII LANDFILLS
B Liner System
B-3 Soil liner
o soil liner thickness and material specifications
- Continued -

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	The administrative record must contain a checklist, or other documentation, which indicates that the design data has been technically reviewed and was accepted. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.		

VIII LANDFILLS
B Liner System
B-3 Soil liner
o soil liner construction procedures

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must include detailed material and construction specifications for placement of the soil liner (40 CFR 264.301).	Technical Soundness Items addressed include: o removal of rocks, roots and other unsuitable material from the soil, o placed in lifts that are less than 6 inches thick, o requires the breaking up of soil clods if necessary, o proper addition of water if necessary, o not constructed of frozen soil along with prevention of freezing of compacted material, and o seal-rolling of final lift for smooth surface. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	GDLS pp. 18-20	

Effective
January 31, 1985

VIII LANDFILLS
B Liner System
B-3 Soil liner
o construction inspection and monitoring program

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan for determining that the soil liner has been constructed as per the plans and specifications (40 CFR 264.301 and 264.303).	Technical Soundness The construction testing and monitoring program specified in the permit must contain, at a minimum: o testing of soil material for permeability, classification, and density; o inspection of the material during placement and the placement and compaction procedures; o procedures for in-place permeability testing; o documentation procedures; and o qualifications of the inspectors. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 38-44 CQA	

Effective
January 31, 1985

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o design description

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain specifications for leachate detection and collection systems. Each landfill unit, except for exempt units (see B-1) is required to have a leachate collection system placed above the top flexible membrane liner and a leachate detection zone located beneath the top flexible membrane liner and above the bottom liner (40 CFR 264.301).	Technical Soundness The permit must contain the following for both the leachate collection system and for the leachate detection system: o A description including drawings of the operation and design of each system must be provided. o Each portion of the systems must have a minimum slope of 2%. o A graded granular filter or filter fabric to prevent clogging of the system should be specified. o The granular material should have a permeability of 1×10^{-7} cm/sec or greater, and must be at least 12 inches thick. o The granular layer may be replaced by an artificial drainage material provided it has equivalent flow capacity. o A drainage tile system of appropriate size and spacing with a sump pump or other means to efficiently remove leachate must be specified. The administrative record should contain the following for both the leachate collection system and for the leachate detection system: o Drawings showing the extent of the system, pipe layouts, slopes, and typical cross-sections should be included. o Data showing the chemical compatibility of all components of the systems with the waste and leachate should be included. o If a granular filter is used, the record must include calculations which show compliance with the requirements discussed on pages 9-94 through 9-97 of the reference (PWGM).	GDLS pp. 4-11 pp. 31-44 . PWGM pp. 9-60 to 9-108 SW-869	

Effective
July 26, 1982

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o design description
- Continued -

REGULATORY REQUIREMENT

EVALUATION CRITERIA

REFERENCES

FINDINGS/COMMENTS

- o The record must contain documentation in the form of test data or acceptable engineering analysis of the permeability of the granular material or equivalent capacity of any artificial drainage material.

- o The administrative record must contain documentation in the form of engineering analysis that the granular drainage layer is stable under the loads and stresses placed on it.

- o The record must include calculations which verify that the pipe sizing and spacing have sufficient capacity. Each system must have its own sumps and they cannot be interconnected.

- o Calculations along with material properties which must be provided show that all components of the systems have sufficient strength to support the loads to which they will be subjected.

The 12-inch-thick layer of granular material on a 2% slope with pipe requirements can be waived if an equivalent drainage system is provided. In that case, the record must contain calculations and data which show that the designed system has flow capacity equivalent to that of the recommended 12-inch granular layer. Criteria to be judged for equivalence are listed on pages 9, 10, 35 and 36 of the reference (GDLS).

The record must also contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o material specifications

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed material specifications for all components of the leachate collection and detection systems (40 CFR 264.301).	Technical Soundness The material specifications should address, at a minimum, the following items. o pipe specifications, o granular material gradations, o artificial drainage material specifications, o pump specifications, and o sump specifications. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 39-44	

Effective
July 26, 1982

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o leachate head restriction

REGULATORY REQUIREMENT

The permit must contain a provision that the maximum leachate in the leachate collection system cannot exceed one foot (40 CFR 264.301).

EVALUATION CRITERIA

Technical Soundness

The record must contain verified engineering calculations showing that leachate collection system has sufficient capacity to maintain a leachate depth of less than or equal to one foot. A detailed discussion of the necessary calculations is contained on pages 9-64 through 9-71 of the reference.

The record also must contain documentation, such as checklists or supporting calculations, indicating that the engineering calculations have been technically reviewed and are approved.

Enforceability

The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).

REFERENCES

PWGM
pp. 9-64 to 9-71

FINDINGS/COMMENTS

Effective
January 31, 1985

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o installation procedures

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain detailed construction specifications for constructing the leachate collection and detection systems (40 CFR 264.301).	Technical Soundness The installation procedures specified in the permit should address, at a minimum, the following items. o pipe placement procedures, o protection of the liners during placement of the systems, o construction procedures for the sumps, and o placement of the granular material and filters. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 39-44	

Effective
July 26, 1982

VIII LANDFILLS
B Liner Systems
B-4 Leachate collection/detection system
o inspection and monitoring procedures during installation

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must contain a construction quality assurance plan to assure that the leachate collection and detection systems are constructed in accordance with the plans and specifications (40 CFR 264.301 and 264.303).	Technical Soundness The construction inspection and monitoring procedures addressed in the permit should include: o qualifications of the inspectors, o testing procedures, o inspection during placement of the materials, and o documentation procedures. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 38-44 CQA	

Effective
July 31, 1985

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The liner system must be placed on a foundation capable of supporting the liner system and resistant to forces which could result in liner failure due to settlement, compression, or uplift (40 CFR 264.301(a)).	Technical Soundness The administrative record must contain geotechnical data and engineering calculations which describe the liner system foundation and verify that it has sufficient strength to support the liner and prevent failures. Detailed discussions of the data requirements and the analyses are included in the reference. General items which should be addressed in support of the foundation preparation procedures include: o test boring information (i.e., location plan and boring logs); o results of soil and/or rock testing; o engineering calculations for settlement analysis, bearing capacity analysis, and landfill slope analysis; and o discussion of the potential excess gas or hydrostatic uplift pressure and subsidence and sinkhole potential. The record also must contain detailed foundation construction specifications and a construction quality assurance procedure for preparation of the foundation. The necessary items are very site specific, but are discussed in general in the references. Finally, the record must contain documentation, such as checklists or supporting calculations, indicating that all engineering calculations and test data have been technically reviewed and are approved. Enforceability The permit must include provisions for certification as per 40 CFR 270.30(k)(2) and inspection during construction as per 40 CFR 264.303(a).	GDLS pp. 39-44 PWGM pp. 9-31 to 9-50 CQA	

Effective
July 26, 1982

REGULATORY REQUIREMENT

The permit must describe the runoff control design as per 40 CFR 270.21(b)(3) and 264.301(g). The design may incorporate features such as channels, holding basins and tanks, pipes, spillways, ditches, ponds, etc.

EVALUATION CRITERIA

Technical Soundness

The administrative record must contain an engineering report and drawings having the necessary documentation supporting the design of the runoff control system. The runoff control system is required to collect and control, at a minimum, runoff from active landfill areas resulting from the 25-year, 24-hour storm event.

Information must include the size and capacity calculations of all hydraulic structures such as pumps, pipes, weirs, spillways, channels, tanks, ponds, etc. The magnitude of the 25-year, 24-hour storm may be determined using data from the U.S. Weather Bureau Technical Publication 40 or other acceptable data. Calculations must be provided for the runoff peak discharge and/or volume resulting from a 25-year, 24-hour storm event. Peak discharge and/or volume must be calculated in accordance with the U.S. Department of Agriculture Soil Conservation Service procedures or similar procedures. Units used to hold runoff must meet the applicable 40 CFR 264 standards (Subpart K for Surface Impoundments, Subpart J for Tanks, etc.).

In addition, the record must contain documentation in the form of calculations, notes, etc., to show that a technical review was conducted on the runoff control system design.

REFERENCES

PWGM
pp. 9-127 to 9-134

PAGM
pp. 8-33 to 8-37

FINDINGS/COMMENTS

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify construction procedures for the runoff control system as per 40 CFR 270.21(b)(3) and 264.301(g).	Technical Soundness The administrative record must contain an engineering report and drawings having the necessary documentation supporting construction procedures. The information must include detailed construction and material specifications. A detailed description of the construction quality control program also must be provided. In addition, the record must contain documentation (e.g., calculations, notes) showing that a technical review was conducted of the construction procedures. Enforceability The permit must specify the monitoring and inspection plan to be followed during construction as per 40 CFR 270.21(d). The permit must require certification by a professional engineer that the runoff control system has been constructed as designed as per 40 CFR 270.30(k)(2). Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 9-127 PAGM pp. 8-33 PWGM pp. 9-147 to 9-177 and pp. 4-5 PAGM pp. 8-44 to 8-48 CQA	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify a maintenance plan for the runoff control system as per 40 CFR 270.21(b)(3) and 264.301(g).	Technical Soundness The administrative record must contain an engineering report having the necessary documentation supporting the maintenance plan. The plan must contain a detailed description of all maintenance operations and the schedule for completing each operation. In addition, the record must show that a technical review was conducted of the maintenance plan. Enforceability The permit must specify an inspection plan for operation of the landfill as per 40 CFR 270.21(d). The operation inspection plan must stipulate that the runoff control system be inspected for damage and malfunction weekly and after storms. The permit must specify the repairs that will be performed in the event that inspection discloses damage or malfunction. The permit also must require that records be maintained of all inspections and repairs or corrective actions. Note: When enforceability of a permit condition is linked to activities conducted under the facility's inspection plan or contingency plan, the reviewer should check those plans to verify that the required activities (and their frequencies) are clearly defined.	PWGM pp. 9-127 PAGM pp. 8-33 PWGM pp. 9-177 to 9-183 PAGM pp. 8-49 to 8-50	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
Bulk and containerized liquid wastes can only be placed in landfills under certain very controlled conditions (40 CFR 264.314).	Technical Soundness Liquid wastes can only be placed in landfills if they have been solidified. This includes bulk or noncontainerized liquids and containerized liquids. The ban also applies to both hazardous and nonhazardous liquids. Exceptions: o no other method of disposal exists as outlined in 40 CFR 264.314(e) o some liquids can be placed in the landfill if for beneficial purposes (see guidance) The administrative record must contain documentation that the method of liquid stabilization is not an absorbent operation, as discussed in the references. It also must indicate the procedures to be followed in testing, handling, and disposing of these wastes within the landfill. Enforceability The permit must contain a provision for testing wastes using the "Paint Filter Test" (Method 9095) as required by 40 CFR 270.30(j). The permit also must contain a condition requiring the owner/operator to maintain records of the testing results in accordance with 40 CFR 270.30(j).	BLM (Additional guidance on the placement of liquids in landfills was being drafted as this is prepared. This guidance will address beneficial purposes and was to be distributed in April of 1986.)	

Effective
April 30, 1985

REGULATORY REQUIREMENT

Each landfill unit must be covered at closure with a cover which minimizes the migration of liquid through the cover, requires little maintenance, promotes drainage, minimizes erosion, accommodates settling and subsidence and has a permeability less than or equal to the liner (40 CFR 264.310). The permit must include a detailed description and drawings of the cover to be used. These conditions also apply to surface impoundments and waste piles closed as landfills.

Effective
July 26, 1982

EVALUATION CRITERIA

Technical Soundness

Guidance reports indicate that the EPA recommended cover should consist of the following (from bottom to top):

- o a 2-foot-thick soil layer having a permeability of 1×10^{-7} cm/sec or less,
- o a 20 mil or thicker flexible membrane liner,
- o a 12-inch-thick drainage layer,
- o a 2-foot-thick soil layer, and
- o a vegetation crop.

The slope of the final cover surface should be at least 3%.

Applicants are not required to use the recommended cover; therefore, some permits will contain covers that are different than the one described above.

The detailed description and drawings of the cover generally should include the following items.

- o drawings showing overall plan view of cover with dimensions and cross-sections showing slopes, layers, and thicknesses;
- o the name, species, and variety of the cover crop;
- o strength, thickness, brand name, and manufacturer (or detailed material specifications) of flexible membrane liner;
- o description of drainage layer;
- o characteristics, thickness, permeability of low permeable soil layer;
- o potential settlement of the cover;
- o potential for gas generation; and
- o effects of freeze-thaw cycles on the cover.

REFERENCES

LDFC
pp. 23-33

PWGM
pp. 9-187 to 9-201

SW-867

FINDINGS/COMMENTS

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS

Also included must be detailed engineering calculations addressing:

- o erosion of the cover soils,
- o free drainage of precipitation off of the cover,
- o free drainage of the drainage layer, and
- o potential of clogging of the drainage layer.

In cases where a cover design other than the recommended cover is used, the record must contain detailed engineering calculations which address:

- o Long-term minimization of liquids through the cover.
- o A demonstration that the permeability of the cover equals or is less than that of the landfill liner or subsoils.

Documentation such as checklists or supporting calculations must be included in the record to show that the engineering analyses provided by the applicant have been technically reviewed and are approved.

Enforceability

The permit must include provisions for certification of closure as per 40 CFR 264.115.

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The hazardous waste constituents specified in the permit must be those which were burned successfully at least to a 99.99 percent DRE during the trial burn, or constituents which exhibit higher heats of combustion (40 CFR 264.344(a)).	Technical Soundness The types and quantities of hazardous waste constituents to be burned in the incineration system must be limited in the permit. A permittee is not permitted to burn hazardous waste constituents whose heat of combustion values (the accepted measure of the degree of difficulty for the constituents to burn) are lower than the POHC's successfully incinerated in the trial burn. Waste constituents may only be restricted if they are listed in Appendix VIII of 40 CFR Part 261. There are two options for identifying the allowable waste feed to the incinerator. The first option covers situations where it is not practical to list all of the wastes that a facility might be permitted to burn. In this option, criteria are identified to establish limitations on the physical and chemical characteristics of the waste input to the incinerator. The second option is more appropriate for so-called "on-site" incinerators used as a part of a chemical process or manufacturing operation. In that instance, it is usually straightforward to specifically identify the waste constituents or classes of wastes that the permittee is permitted to burn. Limitations must be established for each type of waste fed to the incineration system. For example, if the incinerator accepts both solid and liquid feeds, limitations for each must be set in the permit based on the trial burn results. Enforceability Quantitative limitations on waste feed must be set forth in the permit. In addition, the waste analysis provisions (Section II) must specify a frequency for verifying that the waste feed is within the physical and chemical composition limits. [Section 264.341(b)]	GM-HWIP pp. 4-16 through 4-24 MP pp. VI-2 through VI-3	

Effective
April 1, 1983

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify operating conditions for each waste feed stream to the incinerator to assure that the incineration facility meets the performance standards (40 CFR 264.343 and 264.345).	Technical Soundness It is possible that an incineration system can be permitted for more than one waste feed (e.g., the incinerator could operate on one definable waste feed during the summer and another during the winter). In such cases, a complete set of operating limits must be specified for each waste feed. The permit operating conditions for each waste feed must include each of the following: carbon monoxide concentration in the stack gas, waste feed rate, combustion temperature, and a measure of combustion gas flow rate. Other operating conditions can be set where the permit writer finds it necessary to assure compliance with the DRE, HCl, and particulate standards. Examples are air pollution control system operating conditions (e.g., wet scrubber water recirculating rate and pH). The limits set forth in the permit must be based on the trial burn results.	GM-HWIP pp. 4-2 through 4-14	
	The operating conditions should allow for variations in incineration system operating procedures. For example, combustion temperature could be specified as a minimum of 2350 degrees F. Some allowance for normal variations is needed in order to protect against unnecessary activation of the waste feed cut-off system.	GM-HWIP pp. 5-7	
	Enforceability Each set of operating conditions must directly relate to achieving the performance standards. A key purpose of the trial burn is to identify operating conditions that prevail when it is demonstrated through extensive sampling and analyses that the incineration system is in compliance with the performance standards. EPA does not intend to require the permittee to conduct frequent trial burns, which are both costly and time-consuming. Thus, for purposes of permit enforcement, compliance with the operating conditions set forth in the permit is regarded by EPA as compliance with the performance standards [264.343(d)]. If the permittee complies with the permit operating conditions, but it is later shown that the performance standards are not being attained, the permit may be modified or revoked and reissued.		

Effective
April 1, 1983

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
A system must be specified in the permit to automatically cut off waste feed to the incinerator whenever the operating conditions deviate from the limits designated in permit (40 CFR 264.345(e)).	Technical Soundness The purpose of the automatic waste feed cut-off system is to shut off all waste feed to the incinerator whenever the operating conditions are outside the limits specified in the permit. The cutoff valves on the waste feed lines must be interlocked to the appropriate operating conditions (e.g., stack gas carbon monoxide level, combustion temperature). A calibration frequency and test frequency must be specified in the permit. The regulations [264.347(c)] require weekly testing, but monthly testing can be allowed where the permittee has demonstrated that weekly testing will be disruptive and that monthly inspection is sufficient. Enforceability Numerical limits must be set for each permitted operating condition which activates the automatic waste feed cut-off system. The calibration and test frequency must be recorded in the operating log. The log can be reviewed during site inspections by EPA or state personnel.	GM-HWIP pp. 4-14 through 4-16 and 4-25	

Effective
June 24, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify a monitoring system for each specified operating condition (40 CFR 264.347).	Technical Soundness Monitoring systems must be specified for each of the operating conditions (e.g., combustion temperature, waste feed rate, carbon monoxide concentration in the stack gas) listed in the permit. The frequency of monitoring, testing, and calibration must be specified along with the method for recording the monitoring data. Combustion temperature, waste feed rate, combustion gas velocity indicator and CO stack gas concentration must be recorded continuously. Enforceability Frequencies for monitoring each operating condition must be specified in the permit. The permit must include a provision for recording and maintaining monitoring data pursuant to 264.347(d).		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
A permit for incineration may be granted to conduct a trial burn, to operate the incinerator, or both. When a permit includes provisions for a trial burn, permit conditions must address the requirements of 40 CFR 264.344(c)(2) and 270.62.	Technical Soundness The trial burn forms the foundation of a hazardous waste incineration system permit. The trial burn must demonstrate compliance with performance standards and establish operating conditions to ensure continuous long-term compliance with the performance standards. The permit must include the complete trial burn plan as an attachment. The trial burn plan must include all of the information required in 270.62(b)(2). The permit must specify one or more principal organic hazardous constituents (POHC's) for each hazardous waste stream to be burned during the trial burn. These POHC's could be major constituents of the waste stream or could be materials having relatively low BTU content used to "spike" the waste stream. A review of Chapter 2 of the Guidance Manual for Hazardous Waste Incineration Permits is required to assure that appropriate POHC's have been specified in the permit. Since the Regional Administrator can only approve the trial burn plan only if it gives enough information to establish operating conditions, the applicant must modify the plan to include all POHC's the Regional Administrator specifies. The permit must specify that the permittee must make the determinations required by 270.62(b)(6)(i)-(ix). The permit also must require the permittee to submit to EPA a copy of all data collected during the trial burn and the results of all the determinations required by 270.62(b)(6) within 90 days after the completion of the trial burn. Enforceability The trial burn plan provides protocols and schedules which are incorporated into the permit. All aspects of the trial burn plan thus are enforceable.	GM-HWIP Chapter 2	

Effective
June 24, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the parameters and/or constituents to be routinely monitored under the detection monitoring program (40 CFR 264.98(a)).	Technical Soundness The indicator parameters and/or waste constituents specified in the detection monitoring program must be selected so as to be consistent with the goal of detection monitoring -- to allow the earliest possible indication of leakage from the facility. As such, the chosen parameters/constituents must be representative of the waste. In addition, the parameters/constituents must be relatively mobile, stable, and persistent in the subsurface environment. The administrative record must contain results of waste characterization, including analysis to identify both the hazardous and nonhazardous constituents of the facility's waste. In addition, the record must identify any constituents likely to form through chemical reaction. The record must identify those constituents which would be most mobile and persistent, considering all potential attenuation mechanisms. Usually, the most mobile and persistent constituents will be various anions (i.e., chlorides, nitrates, etc.), cations with low adsorption potential, and certain highly mobile organics. Attention also must be given in the record to background levels of proposed parameters/constituents in the facility's groundwater compared to levels anticipated in the waste's leachate. If background levels are too high, it may not be possible to correctly identify that groundwater contamination is occurring. There must be documentation (e.g., notes, testing data) in the record that the permit writer ensured consideration of all the above factors supporting parameter/constituent selection, including presence in the waste, mobility/persistence, and detectability. Enforceability The permit must specify reporting requirements for detection monitoring in accordance with 40 CFR 264.98(g), (h), and (i), and 40 CFR 270.31(c). The permit must specify recordkeeping provisions for detection monitoring in accordance with 40 CFR	PWGM-GWP pp. 190-192, 199-200	

Effective
July 26, 1982

X GROUNDWATER MONITORING - DETECTION MONITORING PROGRAM
A Indicator Parameters, Waste Constituents, Reaction Products to be Monitored
- Continued -

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	270.30(j). The permit must include provisions for certification of detection monitoring records as per 40 CFR 270.30(k)(4). The permit must also reserve the right of the agency to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
6As per 40 CFR 265.97 (a) and (c), the permit must specify, in detail, the individual elements of the detection monitoring system, including the number, location, sampling depths, and design features of all background and compliance point wells.	The monitoring well system must first and foremost be consistent with supporting information in the Part B application defining the "uppermost aquifer" and associated groundwater flow rates and directions. The definition of "aquifer" as presented in 40 CFR 260.10 is "... a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs." Significant yield is determined on a case-by-case basis. In those formations that do not yield significant amounts of water, enforcement authorities may be invoked to have them monitored. Heterogeneity of the subsurface necessitates that care be taken in the selection of well locations and depths. In general, this will dictate the placement of compliance point wells very close to the down-gradient boundary of the regulated unit and in the uppermost permeable, saturated horizon. The information provided by the application to support the uppermost aquifer identification and related well locations must be sufficient to identify and define all logical pathways from the facility. The site specific data offered must consist of subsurface boring logs and hydrogeologic cross-sections, the number of which should be commensurate with the subsurface complexity of the site. Also required are groundwater level data and groundwater contour mapping based on on-site well measurements sufficient to define seasonal variations in groundwater gradient, flow direction and rate. Boring logs and well construction details must be included for existing wells used to determine hydraulic gradients and groundwater flow direction. The number of wells required for a given facility is site specific. The number must be sufficient to provide reasonable certainty that if leakage were to occur, it would be readily detected. Thus, the required number of wells is proportional to the number of potential migration routes. In some cases, multiple depth monitoring may be required where the likely vertical migration route cannot be adequately defined. In determining the number of wells, consideration	PWGM-GWP pp. 15-82,194 TEGD	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	may be required where the likely vertical migration route cannot be adequately defined. In determining the number of wells, consideration must be given to the nature of the leakage (if it occurs). At unlined facilities, leakage is likely to be diffuse and affect a large portion of the facility, while facilities with synthetic liners may undergo "pinpoint" leaks of high rate but small area. Thus, a lined facility may actually require more detailed monitoring to detect small plumes than a comparable unlined facility. Well design and construction features must be consistent with agency guidance. Inert well construction materials, proper sealing techniques, and adequate security features must be incorporated. The record must include a description of the well drilling methods used or proposed. The addition of foreign materials such as drilling muds or fluids into the drilled hole must be avoided. For existing wells, the permit must contain as-built construction drawings or specifications with actual dimensions of depth and screened interval. For proposed wells, a typical design must be included showing anticipated dimensions. Enforceability Assurance that the monitoring network is constructed and maintained as specified in the permit is obtained via agency inspection of monitoring facilities as per 40 CFR 270.30(i)(4).	TEGD	

X GROUNDWATER MONITORING - DETECTION MONITORING PROGRAM
D Sampling, Analysis, and Statistical Procedures
D-1 Sample collection

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
As per 40 CFR 264.97(d)(1), the permit must specify the procedures and techniques to be used for groundwater sample collection.	Technical Soundness The sampling procedures specified in the permit must be consistent and designed to ensure monitoring results that provide a reliable indication of groundwater quality. Procedures for evacuating stagnant water from the well prior to sampling, as well as procedures for withdrawal of the actual sample must be specified. Also, sample collection procedures should specify the method of water level measurement in each well. Of particular importance with regard to sample collection are: o Use of inert materials in sampling equipment to ensure that samples are not contaminated or altered by foreign materials. o Use of sampling methodology which does not result in excessive exposure to the atmosphere or other gases causing chemical alteration. o Specification of adequate procedures to prevent cross-contamination; the procedures specified must be chosen to fit the nature of the sample analysis to be performed. The administrative record must contain documentation that sample collection procedures were reviewed for technical adequacy and were found to be suitable for the type of well construction and the nature of monitoring parameters to be analyzed. This review must include comparison of the proposed procedures to agency guidance with any necessary modifications specified in the permit. Enforceability The permit must include provisions to require that sampling and measurement during monitoring be representative as per 40 CFR 270.30(j)(1). The permit must also include provisions for certification of monitoring results as per 40 CFR 270.30(k)(4) and inspection of monitoring activities as per 40 CFR 270.30(i)(4).	PWGM-GWP pp. 83-109, 194-195 MGWSP	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify procedures to determine whether there has been a statistically significant change over background, indicative of facility leakage, for each parameter monitored at the compliance point (40 CFR 264.98(g)(1), 264.97(h)).	Technical Soundness The administrative record must demonstrate that the statistical procedures specified in the permit are suitable for comparing detection monitoring parameter values to background levels. The basic statistical technique -- the Students' t-test -- is specified in detail in the regulations under 40 CFR 264.97(h)(1)(i). The permit writer has the option of specifying the basic statistical technique or some other valid technique which may be suitable under the circumstances. Several alternative procedures are available as outlined in the agency guidance such as the Mann-Whitney U Test. Such alternative procedures are applicable only when water quality data exhibits specific characteristics. In specifying the basic Students' t-test or an alternative procedure, the permit writer must ensure that the observed characteristics of the monitoring data are such that the procedure is appropriate. For example, the basic Students' t-test is appropriate only when the background levels of a particular parameter are normally distributed (background sample coefficient of variation less than 1.00). The administrative record must contain sufficient background data from previous monitoring to allow such a determination. Alternatively, the permit may specify a statistical procedure based on probable characteristics for background data with the understanding that a permit modification may be necessary if subsequently obtained background data indicates this procedure is not suitable. The administrative record must document that suitable statistical procedures have been specified which achieve a reasonable balance between the probability of falsely identifying a non-contaminating facility and the probability of failing to identify a contaminating facility. The record also must document that the specified procedure(s) are suitable in light of background characteristics. Enforceability The permit must specify reporting requirements for detection monitoring as per 40 CFR 264.98(g), (h),	PWGM-GWP pp. 127-155, 192-194	

Effective
July 26, 1982

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	and (i), and 40 CFR 270.31(c). The permit must specify recordkeeping requirements as per 40 CFR 270.30(j). The permit must also include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the hazardous constituents to be routinely monitored under the compliance monitoring program (40 CFR 264.93 and 264.99).	Technical Soundness Section 264.93 of Subpart F establishes the following criteria for specifying hazardous constituents in the permit: o Constituent is included in Appendix VIII of 40 CFR Part 261. o Constituent has been detected in groundwater in the uppermost aquifer under the regulated unit. When hazardous constituents have been detected in the groundwater, the owner/ operator is required to sample to determine the presence of all Appendix VIII constituents in the groundwater in support of establishing a compliance monitoring program. Documentation must be provided showing that the monitoring network and sampling and analysis procedures used in the program were adequate. The permit writer must ensure that this program was sufficient to identify all Appendix VIII constituents in the facility's groundwater, not just some limited set of constituents. In general, all Appendix VIII constituents identified in the groundwater must be specified in the "groundwater protection standard" for that facility and be included in the list of hazardous constituents to be routinely monitored. The following exclusions/exemptions are possible according to agency guidance: o The constituent(s) cannot reasonably be expected to be in or derived from the waste contained in the facility. o The constituent(s) cannot pose a substantial present or potential hazard to human health or the environment. Recent agency guidance allows permit writers a certain amount of latitude relative to Appendix VIII parameters required for monitoring. If there is any question regarding the parameters specified in the permit, discuss the issue with the permit writer.	PWGM-GWP pp. 158-164	

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REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	The administrative record must document (e.g., notes, testing data) that all specified compliance monitoring constituents meet the above criteria; if any constituents which meet these criteria are not included, supporting documentation/rationale must be provided. Enforceability The permit must establish a groundwater protection standard which specifies hazardous constituents to be monitored as per 40 CFR 264.93. The permit must specify reporting requirements for compliance monitoring as per 40 CFR 264.99(h), (i), and (j), and 40 CFR 270.31(c). The permit must specify recordkeeping provisions as per 40 CFR 270.30(j), and certification of records as per 40 CFR 270.30(k)(4). The permit also must reserve the right of the agency to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).		

REGULATORY REQUIREMENT

The permit must specify concentration limits in the facility's groundwater for each hazardous constituent specified in the permit for compliance monitoring (40 CFR 264.94 and 264.99).

EVALUATION CRITERIA

Technical Soundness

The criteria specified in Section 264.94 are designed to allow no degradation of water quality unless it can be shown that no substantial adverse public health or environmental effects can occur. For constituents where Maximum Concentration Limits (MCL's) have been established in the regulations, the MCL is normally the concentration limit. For other constituents, or where background levels exceed a particular MCL, the following options exist:

- The concentration limit is set such that no degradation beyond background quality is allowed.
- An alternate concentration limit (ACL) is set for the constituent based on an acceptable level of degradation not adversely affecting public health or the environment. Detailed agency guidance exists on the subject of ACL's.

The administrative record must document that the above criteria were followed in establishing concentration limits for each constituent. Where MCL's exist, the technical basis may be simple and straightforward. Where MCL's are not in place, the specification of limits will either require firmly establishing background levels and statistical methods for comparison, or an extensive and detailed study supporting ACL's.

Enforceability

The permit must establish a groundwater protection standard which specifies concentration limits for each hazardous constituent to be monitored as per 40 CFR 264.94. The permit must specify that wherever the groundwater protection standard is exceeded, or whenever hazardous constituents from the facility exceed concentration limits in groundwater between the compliance point and the downgradient facility boundary, the owner/operator must institute a corrective action program under 40 CFR 264.100.

REFERENCES

General:
PWGM-GWP
pp. 164-187

ACL's:
ACLG

FINDINGS/COMMENTS

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REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
	The permit must specify reporting requirements for compliance monitoring as per 40 CFR 264.99(h), (i), and (j), and 40 CFR 270.31(c). The permit must specify recordkeeping provisions as per 40 CFR 270.30(j), and certification of records as per 40 CFR 270.30(k)(4). The permit also must reserve the agency's right to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).		

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the procedures and techniques for sample collection under the compliance monitoring program (40 CFR 264.97(d)(1)).	Technical Soundness The specified procedures must be valid for the particular hazardous constituents monitored in the compliance monitoring program. In addition sampling procedures must be specified for the annual Appendix VIII sampling to detect the arrival of any additional hazardous constituents. Sampling procedures established under the detection monitoring or interim status program may be applicable, but must be reviewed/modified to account for changes in the list of constituents to be tested. See Section XII.D-1 (Detection Monitoring Program - Sample Collection) for additional notes. Enforceability The permit must include provisions to require that sampling and measurement during monitoring be representative as per 40 CFR 270.30(j)(1). The permit must also include provisions for certification of monitoring results as per 40 CFR 270.30(k)(4) and inspection of monitoring activities as per 40 CFR 270.30(i)(4).	PWGM-GWP pp. 83-109, 211-213 MGWSP	

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XI COMPLIANCE MONITORING PROGRAM
D-7 Statistical Determination
D-7a statistical procedure

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the statistical procedures used to determine whether a statistically significant increase over background values has occurred for each hazardous constituent monitored at the compliance point (40 CFR 264.97(h), 264.99(h)(1)).	Technical Soundness The statistical procedure must be adequate to compare monitoring data with the established concentration limits to identify violations of the facility's groundwater protection standard. No basic procedures (e.g., Students' t-test) are specified in the regulations for compliance monitoring. The procedure chosen will be site specific and dependent on the nature of the concentration limits established in the permit (background concentrations vs. specific concentration limits). Concentration limits based on background values require procedures to account for sampling/analysis variability as well as spatial and seasonal variability of background levels. See Section XII.D-8a (Detection Monitoring Program - Statistical Procedure) for additional notes concerning this subject. Concentration limits based on specific limits (MCL's or ACL's) rather than background values require accounting only for variability introduced by sampling/analysis. The most straightforward comparison uses no statistical test at all. Where it is desirable to account for measurement variability, multiple sampling/analysis for each well followed by a statistical analysis such as the Students' t-test may be specified in the permit. Enforceability The permit must specify reporting requirements for compliance monitoring as per 40 CFR 264.98(g), (h), and (i), and 40 CFR 270.31(c). The permit must specify recordkeeping requirements as per 40 CFR 270.30(j). The permit also must include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).	PWGP-GWP pp. 127-155, 206-207	

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REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify concentration limits for each hazardous constituent included in the groundwater protection standard (40 CFR 264.100(a)(1)).	Technical Soundness See notes provided under Sections XI.A (Hazardous Constituents to be Monitored) and XI.A-1 (Concentration Limits) of this protocol. The groundwater protection standard established for the compliance monitoring program is also applicable under a Subpart F corrective action program (CAP). Enforceability The permit must establish a groundwater protection standard which specifies concentration limits for each hazardous constituent to be monitored as per 40 CFR 264.94. The permit must specify that wherever the groundwater protection standard is exceeded, or whenever hazardous constituents from the facility exceed concentration limits in groundwater between the compliance point and the downgradient facility boundary, the owner/operator must institute a corrective action program under 40 CFR 264.100. The permit must specify reporting requirements for compliance monitoring as per 40 CFR 264.99(h), (i), and (j), and 40 CFR 270.31(c). The permit must specify recordkeeping provisions as per 40 CFR 270.30(j), and certification of records as per 40 CFR 270.30(k)(4). The permit also must reserve the agency's right to sample or monitor at specified times to assure compliance as per 40 CFR 270.30(i)(4).	General: PWGM-GWP pp., 164-187 ACL's: ACLG	

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XII CORRECTIVE ACTION PROGRAM
F Sampling, Analysis, and Statistical Procedures
F-1 Sample collection

REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify the procedures and techniques for sample collection to be performed under the corrective action program (40 CFR 264.97(d)(1)).	Technical Soundness As in compliance monitoring, the specified sampling procedures must be valid for the particular hazardous constituents to be monitored in association with the CAP. See Section XI.D-1 (Compliance Monitoring Program - Sample Collection) of this protocol for notes related to sample collection from compliance point wells. For monitoring wells located beyond the point of compliance, less sophisticated sampling procedures for key indicators may be specified for wells known to be grossly contaminated. As concentrations approach acceptable limits, compliance point procedures must be applied. Enforceability The permit must include provisions to require that sampling and measurement during monitoring be representative as per 40 CFR 270.30(j)(1). The permit also must include provisions for certification of monitoring results as per 40 CFR 270.30(k)(4) and inspection of monitoring activities as per 40 CFR 270.30(i)(4).	PWGM-GWP pp. 83-109, 211-213, 260 Also, Manual of Ground-Water Sampling Procedures (Scalf, et al., 1981)	

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REGULATORY REQUIREMENT	EVALUATION CRITERIA	REFERENCES	FINDINGS/COMMENTS
The permit must specify statistical procedures to be followed in demonstrating that corrective measures are effective and in determining whether the facility is in compliance with the groundwater protection standard (40 CFR 264.97(h), 264.99(h)(1)).	Technical Soundness Statistical procedures to determine whether the facility has been brought back into compliance may generally follow the guidance given under Section XI.D-7a (Compliance Monitoring Program - Statistical Procedure) of this protocol. Until groundwater quality improves to a level near compliance, there generally is no need to perform this statistical analysis. When a CAP is in place, statistical analysis must be specified to show that the CAP effectively is reclaiming the facility's groundwater. Generally, a substantial data base must be generated before such statistical determinations are possible, especially where a large area beyond the compliance point is contaminated. Where it is found by the permit writer to be impractical to specify statistical measures to determine effectiveness, the following must be specified in the permit: o A description of the water quality data base to be developed. o A deadline date for assessing the data to determine whether statistical measures to establish effectiveness may be instituted. Enforceability The permit must specify reporting requirements for corrective action program monitoring as per 40 CFR 264.98(g), (h), and (i), and 40 CFR 270.31(c). The permit must specify recordkeeping requirements as per 40 CFR 170.30(j). The permit also must include provisions for certification of statistical results as per 40 CFR 270.30(k)(4).	PWGM-GWP pp. 127-155, 206-207, 260	

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APPENDIX A

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
I	STANDARD CONDITIONS			
A	Effect of Permit [§§270.4, 270.30(g)]	____	_____	_____
B	Permit Actions [§270.30(f)]	____	_____	_____
C	Severability [§124.16(a)]	____	_____	_____
D	Duties and Requirements			
D-1	Duty to comply [§270.30(a)]	____	_____	_____
D-2	Duty to reapply [§§270.30(b), 270.10(h)]	____	_____	_____
D-3	Permit expiration [§270.51]	____	_____	_____
D-4	Need to halt or reduce activity not a defense [§270.30(c)]	____	_____	_____
D-5	Duty to mitigate [§270.30(d)]	____	_____	_____
D-6	Proper operation and maintenance [§270.30(e)]	____	_____	_____
D-7	Duty to provide information [§§270.30(h), 264.74(a)]	____	_____	_____
D-8	Inspection and entry [§270.30(i)]	____	_____	_____
D-9	Monitoring and records [§§270.30(j), 270.30(l)(4)]	____	_____	_____
D-10	Reporting planned changes [§270.30(l)(1)]	____	_____	_____
D-11	Certification of construction or modification [§270.30(l)(2)(i)]	____	_____	_____
D-12	Anticipated noncompliance [§270.30(l)(2)]	____	_____	_____
D-13	Transfer of permits [§§270.30(l)(3), 270.40]	____	_____	_____

Note: Under the provisions of 40 CFR 270.65, R,D&D permits may be issued for a period up to one year. The Administrator may waive permit requirements, except those regarding financial responsibility and those related to public participation. Thus, the reviewer may expect to see a great deal of variation in R,D&D permits. If there are hazardous waste storage facilities associated with the experimental process units, they must be permitted in accordance with the requirements of 40 CFR Parts 270 and 264. Those permit conditions may be evaluated using Sections I through IV of the Permit Quality Protocol.

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
D-14	Compliance schedules [§270.30(l)(5)]			
D-15	Twenty-four hour reporting [§§270.30(l)(6), 264.56(d) and (j)]			
D-16	Manifest discrepancy reports and unmanifested waste reports [§270.30(l)(7) and (8)]			
D-17	Biennial report [§270.30(l)(9)]			
D-18	Other noncompliance [§270.30(l)(10)]			
D-19	Other information [§270.30(l)(11)]			
E	Signatory Requirements [§§270.11, 270.30(k)]			
F	Confidential Information [§270.12]			
G	Documents to be Submitted Prior to Operation [§§270.32, 270.33]			
H	Documents to be Maintained at Facility Site			
H-1	Waste analysis plan [§264.13(b)]			
H-2	Personnel training documents/records [§264.16(d)]			
H-3	Contingency plan [264.53(a)]			
H-4	Closure plan/post-closure plan [§264.112(a)]			
H-5	Closure cost estimate/post-closure cost estimate [§264.142(d)]			
H-6	Operating record [§264.73]			
H-7	Inspection schedule(s) [§264.15(b)]			
H-8	Other documents			

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
II	GENERAL FACILITY CONDITIONS			
A	Design and Operation of Facility [§264.31]	____	_____	_____
B	Required Notices [§264.12]	____	_____	_____
C	General Waste Analysis [§264.13]			
C-1	Parameters to be analyzed for in each waste [§264.13(b)(1)]	____	_____	_____
C-2	Analytical methods [§264.13(b)(2)]	____	_____	_____
C-3	Methods to sample wastes [§264.13(b)(3)]	____	_____	_____
C-4	Frequency of analysis [§264.13(b)(4)]	____	_____	_____
C-5	Wastes from off-site [§264.13(a)(4) and (b)(5)]	____	_____	_____
C-6	Waste characterization requirements for specific types of treatment and disposal [§264.13(b)(6)]	____	_____	_____
D	Security [§264.14]			
D-1	Description of barrier and means to control entry (or 24-hour surveillance system) [§264.14(b)]	____	_____	_____
D-2	Description of warning signs [§264.14(c)]	____	_____	_____
E	General Inspection Requirements* [§264.15]			
E-1	Inspection schedule [§264.15(b)]	____	_____	_____
E-2	Items to be inspected [§264.15(b)(1)]	____	_____	_____
E-3	Type of problems for which each item is inspected [§264.15(b)(3)]	____	_____	_____
E-4	Inspection frequency [§264.15(b)(4)]	____	_____	_____
F	Personnel Training [§264.16]			
F-1	Program director [§264.16(a)(2)]	____	_____	_____
F-2	Training program contents [§264.16(a)(3)]	____	_____	_____

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
F-3	Frequency of training [§264.16(b) and (c)]			
G	General Requirements for Ignitable, Reactive, or Incompatible Waste [§264.17]			
G-1	Ignitable or reactive [§264.17(a)]			
G-2	Incompatibles [§264.17(b)]			
H	Location Standards [§§264.18, 270.14(b)(11)]			
H-1	Seismic considerations [§264.18(a)]			
H-2	Flood proofing description/drawings [§264.18(b)]			
H-3	Flood plan [§264.18(b)]			
I	Preparedness and Prevention			
I-1	Required equipment [§264.32]			
I-2	Testing and maintenance of equipment [§264.33]			
I-3	Access to communications or alarm system [§264.34]			
I-4	Required aisle space [§264.35]			
I-5	Arrangements with local authorities [§264.37]			
J	Contingency Plan			
J-1	Implementation of plan [§264.51]			
J-2	Copies of plan [§264.53]			
J-3	Amendments to plan [§264.54]			
J-4	Contents of contingency plan [§264.52]			
J-4a	response procedures [§264.52(a)]			
J-4b	coordination agreements [§264.52(c)]			
J-4c	emergency coordinators [§§264.52(d), 264.55]			
J-4d	emergency equipment [§264.52(e)]			

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
J-4e	evacuation plan [§264.52(f)]			
J-5	Emergency procedures [§264.56]			
J-5a	notification [§264.56(a)]			
J-5b	identification of hazardous materials [§264.56(b)]			
J-5c	assessment of hazards [§264.56(c)]			
J-5d	notification in event of threat to human health or the environment [§264.56(d)]			
J-5e	prevention of recurrence or spread of fires, explosions, or releases [§264.56(e)]			
J-5f	monitoring following cessation of operations [§264.56(f)]			
J-5g	storage and treatment of released materials [§264.56(g)]			
J-5h	incompatible wastes [§264.56(h)(1)]			
J-5i	post-emergency equipment maintenance [§264.56(h)(2)]			
J-5j	notification and reports [§264.56(i) and (j)]			
J-6	Unit-specific control procedures			
K	Manifest System [§§264.71, 264.72]			
L	Recordkeeping and Reporting			
L-1	Operating record [§264.73]			
L-2	Availability of records [§264.74]			
L-3	Biennial report [§264.75]			
L-4	Unmanifested waste report [§264.76]			

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
M	General Closure Requirements*			
M-1	Requirement for written plan [§264.112(a)]	____	_____	_____
M-2	Content of closure plan [§264.112(b)]	____	_____	_____
M-2a	description of final closure [§264.112(b)(2)]	____	_____	_____
M-2b	maximum waste inventory [§264.112(b)(3)]	____	_____	_____
M-2c	decontamination or removal procedures [§§264.112(b)(4), 264.114]	____	_____	_____
M-2d	other activities required to meet closure standard [§264.112(b)(5)]	____	_____	_____
M-2e	closure schedule [§§264.112(b)(6), 264.113]	____	_____	_____
M-2f	estimated year of final closure (where applicable) [§264.112(b)(7)	____	_____	_____
M-3	Amendment of plan [§264.112(c)]	____	_____	_____
M-4	Notification of partial closure and final closure [§264.112(d)]	____	_____	_____
M-5	Removal of wastes and decontamination or dismantling of equipment [§264.112(e)]	____	_____	_____
M-6	Certification of closure [§264.115]	____	_____	_____
N	Cost Estimate for Facility Closure [§§264.142]	____	_____	_____
O	Financial Assurance for Facility Closure [§§264.143, 264.145]	____	_____	_____
P	Liability Requirements [§264.147]	____	_____	_____
Q	Incapacity of Owners or Operators, Guarantors, or Financial Institutions [§264.148]	____	_____	_____

*The general closure requirements applicable to all types of hazardous waste management units are listed under item M. The specific technical requirements applicable to each type of unit are listed under those units.

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
III	DESIGN AND OPERATING CONDITIONS			
A	Process Description			
A-1	Unit processes (including treatment chemicals)	____	_____	_____
A-2	Process flow	____	_____	_____
B	Design and Construction of Process Units			
B-1	Design plans and specifications	____	_____	_____
B-1a	process units	____	_____	_____
B-1b	pollution control equipment	____	_____	_____
B-2	Materials of construction	____	_____	_____
B-3	Construction procedures and specifications (for new units)	____	_____	_____
B-4	Construction monitoring and inspection	____	_____	_____
C	Operations			
C-1	Wastes	____	_____	_____
C-1a	allowable types and quantities of wastes	____	_____	_____
C-1b	waste feed rates	____	_____	_____
C-1c	sources of wastes (where applicable)	____	_____	_____
C-1d	specific prohibitions or exclusions	____	_____	_____
C-2	Operating limits	____	_____	_____
C-2a	operating limits (e.g., flow rates, temperature, pressure)	____	_____	_____
C-2b	chemical feed rates	____	_____	_____
C-2c	retention times, mixing rates, etc.	____	_____	_____
C-3	Operating procedures	____	_____	_____
C-4	Operating controls	____	_____	_____

Facility Name _____
ID No. _____

CHECKLIST FOR RCRA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMITS*

		Provided (Y/N) or NA	Location	Comments
C-4a	monitoring and instrumentation			
C-4b	process controls (valves, etc.)			
C-5	Procedures for treating and disposing of by-products or off-spec product			
C-6	Process monitoring and reporting (to evaluate efficacy of the process)			
C-6a	parameters to be monitored			
C-6b	monitoring and sampling methods and instrumentation			
C-6c	analytical methods (where appropriate)			
C-6d	required form of data			
C-6e	statistical procedures (where appropriate)			
C-6f	recordkeeping requirements (related to process efficiency)			
C-6g	reporting requirements (related to process efficiency)			

APPENDIX B

PROTOCOL FOR EVALUATING PERMIT CONDITIONS RELATED TO CORRECTIVE ACTION FOR CONTINUING RELEASES

PROCEDURES FOR EVALUATING RCRA PERMIT CONDITIONS FOR CORRECTIVE ACTION FOR CONTINUING RELEASES

Introduction

Unlike other RCRA permitting requirements included in this evaluation protocol, EPA had not issued final guidance and regulations for permitting requirements pursuant to Section 3004(u) of RCRA at the time that this protocol was prepared. Therefore, the evaluation criteria presented here are conceptual in nature. These criteria are intended to suggest a thought process which will facilitate an efficient and focused review of permit conditions related to corrective action. As EPA's policies and requirements in this area evolve, these evaluation criteria may be revised accordingly.

The criteria utilize the results of the RCRA Facility Assessment (RFA) as the point of departure for the permit evaluation process. For purposes of this process, it is assumed that an RFA has been performed for the facility, and that it is technically sound and well documented in the administrative record. The major objectives of the permit evaluation are:

- To evaluate the responsiveness of the permit conditions to the RFA conclusions and recommendations;
- To evaluate how clearly and precisely the permit conditions place enforceable requirements on the permittee; and
- To evaluate the completeness of documentation in the administrative record regarding the permit conditions.

For ease of evaluating it is recommended that the review be conducted in two steps. The first step is a comparison of the scope of the permit conditions with the RFA conclusions and recommendations to determine if the major concerns identified in the RFA have been

addressed. The second step involves a more detailed review of conditions to assess their technical soundness and enforceability.

Step 1 - Review of Scope of Permit

The permit conditions should be reviewed and a tabulation of the following items prepared:

- identification of each solid waste management unit (SWMU) or area of the facility to which corrective action conditions apply;
- for each SWMU or area, the environmental media which are addressed (groundwater, surface water, air, subsurface gas, soils); and
- for each SWMU or area, the generic type(s) of action required (remedial investigation, corrective measures, interim corrective action requirements, etc.).

The RFA documentation should then be reviewed and a tabulation of the same types of information prepared. The RFA may not identify the specific follow-up actions required, but rather may recommend "further analytical study" or "additional data collection" through a RCRA Facility Investigation (RFI). For purposes of this review, recommendations involving information collection should be considered as RCRA Facility Investigation recommendations.

A comparison of the permit conditions with the RFA recommendations and conclusions will provide an indication of whether the conditions address all major concerns identified in the RFA. Any discrepancies should be noted, since they will be considered in more depth in the second step of the evaluation process.

Step 2 - Review of Quality of Permit Conditions

The second step in the process involves reviewing selected aspects of the permit conditions to assess their technical soundness and enforceability, with the evaluation criteria as a guide. The first set of criteria again addresses the responsiveness of the conditions to the recommendations and conclusions of the RFA, with the review at a greater level of detail than that performed in the first step of the process. In particular, if the permit conditions do not address all major concerns of the RFA (or conversely, if there are conditions required which do not appear to be discussed in the RFA documentation), then an evaluation of the administrative record should be made to determine if this apparent discrepancy has been explained.

The second set of criteria addresses the degree of specificity with which corrective actions are applied to individual units or to particular areas of the facility. In certain cases, it may not be possible or desirable to apply permit conditions to each individual SWMU. For example, data might not be sufficient at the time that the RFA is conducted to correlate environmental contamination with individual units likely to be the sources of contamination. On the other hand, even if individual units can be identified as contamination sources there may be cases where remedial investigations or clean-up activities can most effectively be performed for a group of units or for areas of the facility. The evaluation criteria are directed toward determining if the permit unambiguously defines the units or areas to which the conditions apply, and if the documentation provides the rationale for applying these conditions across several units or over major portions of the facility.

The next two sets of criteria are designed to assess whether the permit conditions are structured to provide for sufficient oversight of corrective action activities required of the facility owner/operator. If the permit calls for the development of a release characterization plan, the owner/operator should be required to submit this plan to EPA and/or the state for approval by a certain date. In addition, the

permit should have clear, distinct milestones which provide specific direction to the owner/operator and reporting requirements to assure that the owner/operator has complied with the milestones.

Evaluation criteria also are included addressing interim corrective measure requirements. If the RFA recommendations call for interim measures to reduce the risks to human health and environment, the permit should include interim corrective action requirements responsive to these recommendations, unless the administrative record provides an explanation for excluding them (for example, they were addressed in an enforcement action such as a §3008(a) or §106 order). The record also should show that any interim measures specified in the permit are appropriate by describing the health and environmental factors which were considered in developing the measures.

The remaining evaluation criteria are directed to any RCRA Facility Investigation (RFI) requirements which may be part of the permit conditions. Since RCRA Facility Investigations must be designed on a case-by-case basis and RFI requirements will vary widely, the permit evaluation process must be directed to determining if certain general principles are followed. For purposes of this review, these general principles are:

- The objectives of the RFI should be clearly identified in the permit documentation. As described in the evaluation criteria, the objectives will depend on the degree to which conclusions regarding environmental contamination can be derived during the RFA. RFA conclusions can vary widely, from a simple conclusion that a release is "likely" to a detailed analysis from which corrective measures can be designed. The objectives of the RFI must be consistent with the RFA conclusions. For example, if the RFA could only conclude that a release is "likely," the RFI objectives should include a confirmation that a release has actually occurred. On the other hand, if sufficient data were available during the RFA

to confirm a release, the objectives of the RFI permit conditions might be directed toward obtaining additional data on the nature, rate, and extent of contamination. The RFI is expected to produce information to facilitate the design of appropriate remedial measures.

- RCRA Facility Investigation requirements should clearly and specifically define the major elements to be included in RFI plans. The evaluation criteria address RFI plans on a medium-by-medium basis, and identify those elements which must, as a minimum, be required. Not all permits will require the same types of investigations -- for example, it may not be necessary to perform a hydrogeologic assessment as part of a ground-water remedial investigation if sufficient hydrogeologic data were available for the RFA. However, if a hydrogeologic assessment is needed, the permit conditions should define the elements of the required hydrogeologic assessment plan, including as a minimum the elements identified in the evaluation criteria.

PE. .T REQUIREMENT	EVALUATION CRITE. .	REVIEWER FINDINGS/COMMEN.S
RCRA Facility Investigation plan - air.		
1. Air monitoring plan.	If an air monitoring plan is required as part of the remedial investigation, the plan must include the numbers and locations of all proposed upwind and downwind monitors with a demonstration of the adequacy of monitor placement to meet investigation objectives.	
2. Sampling and analysis plan.	If air monitoring is required as part of the remedial investigation, a sampling and analysis plan must be required which includes the following: o List of parameters selected for analysis and rationale for their selection. o Proposed locations for sampling and rationale for their selection. o Proposed sampling procedures and equipment. o Proposed frequency and duration of sampling. o Proposed sample handling and preservation procedures, including chain of custody procedures. o Proposed laboratory analytical techniques, including QA/QC procedures.	

PERMIT REQUIREMENT	EVALUATION CRITERIA	REVIEWER FINDINGS/COMMENTS
RCRA Facility Investigation plans - surface waters.		
1. Hydrologic assessment plan.	If a hydrologic assessment plan is required in order to assess the potential of surface water contamination by surface or subsurface migration of contaminants from the SWMU or area of the facility of concern, the plan must include the following, as necessary: o Identification of surficial features (e.g., topographic locations, manmade barriers, soil/vegetative cover descriptions, etc.) relevant to characterization of drainage patterns between the SWMU or area of the facility of concern and adjoining bodies of surface water. This evaluation is not necessary if releases to surface waters via surface pathways are not of concern. o Identification of types of recharge and discharge between surface waters and aquifers potentially contaminated by the SWMU or area of the facility of concern. This evaluation is not necessary if releases to surface waters via subsurface pathways are not of concern. o Characterization of all bodies of surface waters potentially affected by the SWMU or area of the facility of concern (e.g., flow rates, seasonal/diurnal variation in flows, delineation of 100-year floodplain, etc.).	
2. Surface water monitoring plan.	If a surface water monitoring plan is required as part of the remedial investigation, the plan must include the numbers, locations, and depths of all proposed upstream and downstream monitoring points with a demonstration of the adequacy of monitor placement to meet investigation objectives.	
3. Sampling and analysis plan.	If surface water monitoring is required as part of the remedial investigation, a sampling and analysis plan must be required which includes the following: o Proposed sampling procedures and equipment. o Proposed frequency of sampling and number of samples to be obtained during each sampling cycle. o Proposed sample handling and preservation procedures, including chain of custody procedures. o Proposed laboratory analytical techniques, including QA/QC procedures. o Proposed list of parameters selected for analysis, and rationale for their selection.	

PE. .T REQUIREMENT	EVALUATION CRITE. .	REVIEWER FINDINGS/COMME. .
RCRA Facility Investigation plans - soil.		
1. Soil sampling plan.	If soil sampling is required as part of the RFI, the sampling plan must include proposed number and locations of samples and/or proposed grid system and depths and each sampling location. Locations to obtain background samples must be identified. A demonstration of the adequacy of the proposed sampling approach to meet investigation objectives must be made.	
2. Sampling and analysis plan.	If soil sampling is required as part of the RFI, a sampling and analysis plan must be required, to include the following: o Proposed sampling procedures and equipment. o Proposed sample handling and preservation procedures, including chain of custody procedures. o Proposed laboratory analytical techniques, including QA/QC procedures. o Proposed list of parameters selected for analysis, and rationale for their selection.	

PERMIT REQUIREMENT	EVALUATION CRITERIA	REVIEWER FINDINGS/COMMENTS
RCRA Facility Investigation plans - groundwater		
1. Hydrogeologic characterization plan.	If a hydrogeologic characterization plan is required as part of the RCRA facility investigation, it should provide the following: o Description of hydrogeologic properties (e.g., depth, thickness, hydraulic conductivity, lithology, etc.) of all hydrogeologic units of concern. o Description of aquifers of concern (e.g., depth, vertical and horizontal flow components, water level contour maps, areas of recharge and discharge, etc.), including a description of manmade influences, and natural seasonal and diurnal influences.	
2. Groundwater monitoring plan.	If a groundwater monitoring plan is required as part of the remedial investigation, it must include the following: o Numbers and locations of all proposed background and downgradient wells, with a demonstration of the adequacy of well placement. o Description of each proposed well (e.g., size, depth, screening intervals, materials of construction, etc.). o Description of proposed well development and completion procedures.	
3. Sampling and analysis plan.	If groundwater monitoring is required as part of the RFI plan, a sampling and analysis plan must be required, to include the following: o Proposed sampling procedures (e.g., well evacuation procedure, sample withdrawal procedures, etc.) o Proposed frequency of sampling and number of samples to be obtained during each sampling cycle. o Proposed sample handling and preservation procedures, including chain of custody procedures. o Proposed laboratory analytical techniques, including QA/QC procedures. o Proposed list of parameters selected for analysis and rationale for their selection.	

PE. T REQUIREMENT	EVALUATION CRITE. ,	REVIEWER FINDINGS/COMMEN.S
RCRA Facility Investigation plans - introduction.	Two general approaches may be taken in requiring permittees to perform RCRA Facility Investigations. The permittee can be required to prepare a proposed RFI plan and submit it to the regulatory authority, or the permit conditions may specify the RFI plan. The specific elements of the plan will vary on a case-by-case basis depending on the objectives of the investigation. For example, if the sufficient hydrogeologic data is available at the time the RFA is performed, it may not be necessary to require any additional hydrogeologic assessment studies. However, if such studies are necessary, there are certain types of information which should be included in the hydrogeologic assessment plan. In many cases the submission of a Release Characterization Plan (RCP) is necessary. In such cases, the permit will contain specific conditions aimed at characterizing releases. The following criteria identify the minimum types of information which must be included in permit conditions defining RCRA Facility Investigation plan requirements for each environmental medium.	

PERMIT REQUIREMENT	EVALUATION CRITERIA	REVIEWER FINDINGS/COMMENTS
Objectives of RCRA Facility Investigations.	Technical Soundness The objectives of remedial investigations to be conducted must be clearly described in the permit documentation. These objectives and the specific types of investigations required depend on the degree to which conclusions could be drawn in the RFA. In general, there are five levels of detail in conclusions which result from an RFA, depending on the quality of information available at the time of the assessment: o Inability to arrive at any conclusion regarding releases: In this case, no data are available, and no conclusion can be reached. Permit conditions will focus on monitoring the various media to obtain evidence regarding releases. In some cases it will be necessary to sample the unit (e.g., landfill) first to characterize its contents and to define the hazardous constituents of concern. o Determination that a release is "likely": In this case, information was too sparse to enable a positive determination that a release has actually occurred. Permit conditions, of necessity, must include requirements to obtain the data needed to make a positive determination. o Determination (either through quantitative environmental data or qualitative evidence such as vegetative stress) that a release has occurred, but no determination regarding the extent of the release: In this case, permit conditions will probably be directed toward obtaining new information to quantify the potential extent and nature of the release. o Determination that a release has occurred, with limited data to enable a general characterization of the extent of contamination: In this case, permit conditions would probably be directed toward obtaining specific quantitative data to fully characterize the nature and extent of the release and to provide information required to define the remedial alternatives to be considered. o Determination that a release has occurred, with enough data to define the extent of contamination and design corrective measures: In this case, permit conditions would possibly not require additional remedial investigations, but would be directed toward the design of corrective measures.	

PE. F REQUIREMENT	EVALUATION CRITE.	REVIEWER FINDINGS/COMME.S
Interim corrective action requirements.	Technical Soundness Permit conditions must include interim corrective action requirements for all units and/or areas of facility where such measures are recommended in the RFA or any enforcement action. If there are units or areas for which interim steps are recommended, but for which no such permit conditions are provided, the permit documentation must provide an explanation. The permit documentation must show that each interim corrective action requirement is appropriate to reduce the threat to human health and the environment by indicating the factors considered in developing the requirement. Factors considered include: o Actual or potential exposure to hazardous wastes or constituents by nearby populations, animals, or food chain; o Actual or potential contamination of drinking water supplies or sensitive ecosystems; o High levels of hazardous wastes or constituents in soils largely at or near surface, that may migrate; o Weather conditions that may cause hazardous wastes or constituents to migrate or be released; o Potential for exposure to hazardous wastes or constituents as a result of an accident, fire, explosion or failure of a container or handling system; o Potential for exposure to hazardous wastes or constituents as a result of a release or potential for release from a transportation-related source; o Other situations or factors which may pose threats to human health or the environment. Enforceability Interim corrective action requirements must be clearly defined and include specific date(s) for compliance.	

PE[illegible] REQUIREMENT	EVALUATION CRITE[illegible]	REVIEWER FINDINGS/COMMEN[illegible]
Definitions of milestones of progress.	Technical Soundness The permit conditions define discrete milestones for implementing the corrective action requirements of the permit. The milestones must identify specific actions to be taken, and define any results which are to be obtained. While the milestones will be tailored to individual facilities and units, examples of milestones which might be included in permit conditions include: o Initiation of interim corrective action requirements o Preparation and submittal of proposed hydrologic, geohydrologic assessment plans o Preparation and submittal of proposed monitoring plans o Installation of sampling/monitoring equipment o Submittal of sampling monitoring results (may be on a periodic basis) o Submittal of proposed corrective measures The RFI guidance may combine some of these milestones (i.e., "phased" monitoring approach). Enforceability Milestones must include specific compliance measures and date(s). Reporting requirements must be included for each milestone unless they are clearly inappropriate.	

PE[illegible] REQUIREMENT	EVALUATION CRITER[illegible]	REVIEWER FINDINGS/COMMEN[illegible]
Requirements for submitting RCRA Facility Investigation (RFI) plans for approval.	Technical Soundness The permit conditions must require that proposed RCRA Facility Investigation plans developed by the applicant be submitted to the regulatory authority for approval. If the RFI plan is developed in discrete phases (e.g., geohydrologic characterization plan, well installation plan, sampling and analysis plan), the permit conditions must identify distinct milestones at which portions of the plan are to be submitted to the resulting authority for approval. In those rare cases where a RFI plan is well defined by permit conditions, this evaluation is not necessary as part of the permit quality review. Enforceability The requirements for submitting remedial investigation plan specify date(s) for submittal, as well as elements to be included in the plan.	

PERMIT REQUIREMENT	EVALUATION CRITERIA	REVIEWER FINDINGS/COMMENTS
Identification of SWMU; or areas of facility subject to permit conditions	Technical Soundness The permit administrative record must clearly and consistently specify the SWMUs or areas of the facility for which corrective action permit conditions are required. The rationale for selecting the geographic coverage of the permit conditions must be provided in the permit documentation. There are several approaches which might be taken in defining the geographic area to be covered: o SWMU specific requirements: If requirements apply to individual units, the nomenclature used to identify these units must be specific and consistent with the nomenclature in the permit documentation (e.g., "Unit #3 - Construction Landfill"). The permit documentation must provide the rationale for recommending corrective actions for each unit. o Multiple SWMU study area requirements: If corrective action permit conditions are applied to a block of units, the permit and documentation should identify the individual SWMUs within each study area. The permit documentation should provide the rationale for combining the units into one study area (e.g., "close proximity of units; similar wastes managed in units and RFA could not distinguish between sources of contamination"). o Facility-wide requirements: If the permit conditions are applied on a facility-wide basis, or for major areas within the facility, the boundaries of the facility should be specified. The permit documentation should provide the rationale for the facility-wide approach (e.g., "groundwater contamination was found in monitoring wells across the facility"). Enforceability Nomenclature to identify individual SWMUs should be consistent in the permit and permit documentation. In certain cases, the exact location of the unit within the facility may not be known; in this case, identification of the unit covered by permit conditions must be especially clear. Permit conditions applied to areas of the facility must reasonably define the geographic area covered by the conditions to minimize ambiguity.	

PER REQUIREMENT	EVALUATION CRITER	REVIEWER FINDINGS/COMMEN.
Responsiveness of permit conditions to RFA conclusions and recommendations.	Technical Soundness Every SWMU or area of facility for which further action is recommended in the RFA must be covered with corrective action permit conditions. If no permit conditions are provided for SWMU, or areas for which the RFA recommends further action, the permit documentation must provide an explanation. For each SWMU or area of the facility for which further action is recommended in the RFA, all environmental media of concern considered in the recommendations must be addressed in the permit conditions. If particular environmental media are not addressed, the permit documentation must provide an explanation. For each SWMU or area of the facility for which further action is recommended, all specific recommendations (e.g., "groundwater investigations should include analyzing for X contaminant") must be reflected in the permit conditions. Permit conditions will vary in level of detail since the release characterization plan must provide flexibility for evolving investigations. If particular recommendations are not addressed, the permit documentation must provide an explanation. Enforceability The types of corrective actions specified in the permit conditions must be consistent with the recommendations in the permit documentation.	